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RESEARCH INSTITUTE FOR ECONOMICS
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CONTENTS

TOWARD THE NEGATIVE PICTURE THEORY OF COMMERCIAL DOUBLE-ENTRY BOOKKEEPING AND FINANCIAL ACCOUNTING

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1. Introduction—Proposing a "negative picture" view of the business firm and of accounting

The purpose of this article is to develop a hopefully new idea on the business activity and to expound a new theory on the commercial double-entry bookkeeping and financial accounting.

Our starting point is quite common. We assume all business firms are carring on the process, "cash to more cash", by investing and disinvesting activities.Cash in a firm is viewed here, however, not as a positive economic force contributing to the production of future revenues. Cash does have such a future-oriented potential, of course. No one can deny that. Our point simply is that such a "positive picture" view of economic resources is not consistent with the conventional accounting measurement.

What, then, is the dimension of business activities being captured by the actual accounting practice ? That will be termed a "negative picture" theory, and explained in the following.

By this jargon, we mean cash is doomed to the loss, say, by future payments or deprival. This aspect of awaiting current or future deprival will be stressed. Our hypothesis is that current, conventional bookkeeping records, and expresses, this negative dimension of a firm's assets, capital and income. A systematic development of this idea is offered immediately.

2. The "Negative Picture" View of Assets, Capital and Business Income

Note that not only cash is awaiting loss. All the various kinds of a firm's assets are destined to deprival (i.e., being lost) by consumption, utilization, transfer or simply by forfeiture. In this sense, all those goods represent "not yet lost" funds invested in them. We will call this "not-yet-loss".

This view of the essense of every asset as "not-yet-loss" leads us to a unique valuation basis of the economic good. That is, "not-yet-loss" is tantamount to "waited

losses", which in turn can be best quantified by the amount of money required, if the good were deprived, to replenish the firm's nominal capital. This value will be called "nominal ownership value". This label suggests the attribute represented by accounting practice lies in the cash saving from securing ownership of the good rather than in its future-oriented economic value. This "cash saving" and "not-yet-loss" concepts are both sides of a coin, emanating from our "negative picture theory".

Consistency of this valuation hypothesis with current accounting measurement will be best exemplified by valuation rule of cash. This asset is recorded by its quantity of monetary units, and not by its discounted present value of the future cash inflow series which it can generate from its most profitable investment. Our "not-yet-loss" hypothesis is consistent with this valuation. If cash of 100 yen is lost, no more or no loss than the same units of cash is required to recover the firm's capital.

Our hypothesis thus is that the assets are "not-yet-losses". Then, how about capital ?

(a) Liabilities can be construed as "losses-in-future". The stress is placed on "loss" even though it will occur in future, whereas in case of assets the focus centers on the "not-yet-occurring" aspect of the waited loss. In this sense, assets and liabilities capture the positive and negative dimensions of the same thing—i.e., the wealth of the firm—respectively.

(b) Stockholders' equity is the excess of "not-yet-losses" over "losses-in-future". As such, it can be characterized as that part of the "not-yet-losses" remaining after the redemption—or covering—of all the losses-in-future. Thus, equity capital corresponds to a part of "not-yet-losses" but not the same thing. Equity, like debts, denotes "suffering-of-the-loss" aspect even though in the future, while the assets, as stated above, represents the positive, "not-yet-occurring" dimension. Consequently, our conclusion is that stockholders' equity will be best represented by the label of "possible loss".

We have completed characterizing the balance sheet items. So, let us move to the income statement and its underling concepts.

The essence of our negative view on the business activities lies in the expression, "not-yet-losses (assets) → more of the not-yet-losses". It follows the business net income must be defined as an increase in "not-yet-losses".Since this increase in assets is naturally reflected on the equity side of the balance sheet, our second interpretation follows that net income is an increase in "possible-loss". This characterization corresponds to the fact that business income is subjected to deprival by dividend payment, accidental losses et al.

These consideration has been restricted to the domain of the balance sheet. What is business income, then, from the income statement point-of-view ?

From this standpoint, our theory is that income is an "increase in loss". And so,

business firms can be said to be pursuing maximization of losses in reality when man commonly refers to the so-called profit-maximizing firm. These propositions are, so to speak, the culmination of our negative picture theory of the business firm and accounting. But, how are those statements possible ?

Note that revenue derives from selling of goods, which shows (gross) loss as valued by the market, selling price. A difference between, say, fire loss and this selling loss simply lies in obtaining or not, of compensations. Revenues, thus, is nothing but "compensated-loss". Since net income is the difference between revenues and expenses, net income is seen to be an excess of the "compensated-loss" over the expenses which are the same loss measured by past and internally generated costs, not by current market prices. Logically, then, business income is an increase of loss, and this is the contributing factor to the earning of business income as a net-asset-increase.

We anticipate a couple of theoretical problems in accounting could be better attacked when the business income is viewed as an increase in loss, and not as an increment of positive economic value.

3. The Negative Picture Theory of the Commercial Double-entry Bookkeeping

It will be attempted to demonstrate how the above-stated negative picture theory can contribute to the understanding of the double-entry bookkeeping process.

Our fundamental rule on book entry is that occurrence of positive economic forces (e.g., acquisition of "not-yet-losses", decrease of "loss-in-future, etc.) is to be debited and that occurrence of all negative forces (e.g., accrual of "loss-in-future" (liabilities), decrease of "not-yet-losses", et al.) is to be credited.

We will aply this rule to record some typical business transactions in double-entry bookkeeping.

(a) Issued capital stock.

This is acquisition of cash (or any non-monetary assets) by incurring risk of loss or duty of repayment to the stockholders. Therefore, some not-yet-losses flow in as a positive force, followed with possible-loss of the same amount as a negative power. As a consequence, the entry should be

⊕	⊖		
Not-yet-losses		¥XXXX	
	Possible losses		¥ XXXX

(b) Purchase of inventory goods.

This is a simple exchange of a form of not-yet-loss with another of that (i.e., cash vs. merchandise goods). Therefore, the required entry must be

⊕	⊖		
Not-yet-loss		¥XXXX	
(ex., inventory)			
	Not-yet-loss		¥ XXXX
	(ex., cash)		

Production process in manufacture can also be classified into this category.

(c) Selling of inventory goods.

In essence, this kind of transactions clearly belongs to (b) above, because it consists in an exchange of some "not-yet-loss" (e.g., an inventory good) with another (e.g., received cash). Our hypothesis, however, is that considering the importance of this transaction to the firm, accountants have chosen to separate this in the following two steps for the production of detailed information.

(i) Hypothetical recovery of incurred losses under stationary condition. On one hand, the entry usually is made :

⊕	⊕		
cost of sales		¥XXXX	
	inventory goods		¥ XXXX

The reason for the creditor entry is self-evident: a not-yet-loss has decreased. More difficult is a consistent explanation for the debtor side. Is expenses occurrence of a positive economic force ? We dare say, "Yes, in a sense." In what sense, then ?

In our negative picture theory, business income is interpreted as an excess of compensated loss (i.e., revenue) over internally incurred losses (i.e., periodic expenses). If these expenses as losses are measured by amounts which could have been avoided if no activities had been planned nor performed during the year—referred to as the "stationary condition"—, business income as an excess of compensated, over avoidable, losses clearly indicates the degree to which this year's activities have been efficient in increasing wealth of the firm. It is so because the ex-post value of business activities depend, to a large extent, upon how much the compensation exceeded the otherwise (i.e., under the stationary alternative) avoidable losses.

This analysis has shown the relevance of conceptualizing expenses as "avoidable losses under stationariness" and measuring them accordingly. Our hypothesis is that bookkeeping has developed as if it were designed to accomodate this interpretation of annual expenses. The "avoidable loss" is economically equivalent to imaginally "recovered" loss under that stationariness assumption. And hence, as a recovery, that is, as incoming of

positive force, all expenses must be recorded on the debtor side.

(ii) The incurring of compensated losses.

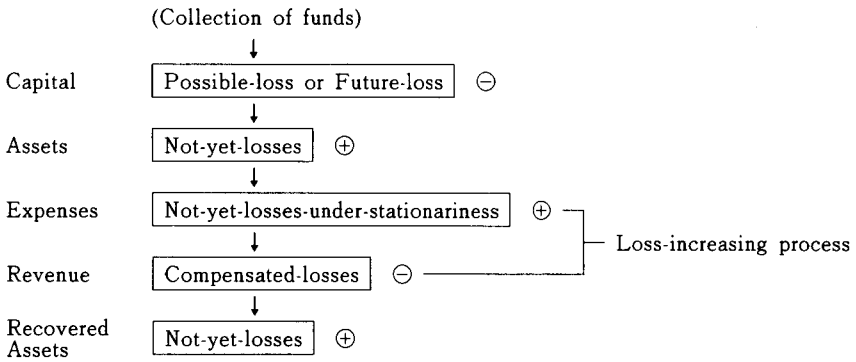
The other side of sales transaction is the realization of revenue and accompanying receipt of compensation. An appropriate example will be:

⊕	⊖	
cash		¥XXXX
	sales	¥ XXXX

Interpretation of the debtor side is quite easy: it denotes an increase in not-yet-losses (assets). We have also explained the compensated "loss" character of revenue, so as a loss it is an incurring of negative power. Hence, the creditor entry is appropriate.

We will try to aggregate our theory of business activity and bookkeeping in Table 1.

Table 1. The Negative Picture of Business Activity Process



Receipt of economic goods from equity or debt capital will result in the firm incurring the risk of "possible-loss" of the goods or the duty of future redemption–i. e., future-loss–, accompanied with acquisition of "not-yet-losses". Most of the obtained goods will be utilized, that is, intentionally deprived, to get more of assets (not-yet-losses)–the step of collected "not-yet-losses". This deprival process is, as stated aboved, divided into two phases of expensing (occurring of not-yet-losses-under-statianriness) and of earning revenues (compensated-losses). An important function of comparing the compensated, with avoidable, losses consists in evaluating the efficiency of business efforts with the latter amount as a benchmark.

Table 2 reflects interpretation of the balance sheet as well as the income statement in the light of our negative picture theory.

Table 2. A Negative Picture Interpretation of Financial Statements

⊕	Balance sheet	⊖
Assets (Not-yet-losses)		Liabilities (Future-losses) Equities (Possible-losses) Net income (An increase in not-yet-losses and in possible-losses)
⊕	Income statement	⊖
Expenses (Not-yet-losses-under-stationariness) Net income (An increase in compensated-losses)		Revenues (Compensated losses)

4. Concluding Remarks–Some implications for financial accounting

We have thus developed our negative picture theory of double-entry bookkeeping. An advantage of our view seems to lie in the simplicity of explanation with respect to the income statement aspect. Revenues are to be credited to the income account because it is a loss. Annual expenses must be debited because they represent positive economic powers in the sense of acquisition (or recovery) of not-yet-losses-under-the-stationariness-assumption. And both of these concepts have been shown to rest on our negative picture view of business income as an increase in loss.

We wish you to note, however, a further-reaching implications of our theory to the understanding of conventional accounting measurement rules.

(1) Why is it that revenues are generally recognized at the times of sales ? Our answer is that revenues as "compensated losses" only occurs on the delivering of merchandise to customers. Conversion of raw materials into products generates a gross loss of the former good, of course, but there occur no compensations as yet. Collection of receivables in cash will surely result in the loss of the claim, but it is not the bringing in of compensation. The compensation had been provided at the time of sale in the form of the receivable, and the collected cash simply means a change in the kind of the compensation.

(2) Why is the lower-of-cost-or-market rule admitted despite general prohibition of

recognizing unrealized profits ? Our answer: if the inventory had not been purchased before the end of this year and if it were acquired at the declined year-end price, the loss between the higher actual cost and the current replacement cost could have been avoided. In this sense, this valuation loss does belong to a "not-yet-loss-under-stationary-condition" (="avoidable loss") and as such, must be charged to current income account.

(3) In accounting practice, historical acquisition cost means, strictly speaking, a "normal" cost rather than the actual cash outlay. In accounting literature, the normality criterion especially refers to (a) eliminating from costs abnormal physical consumptions[1] and (b) excluding abnormally high portions of acquisition prices[2].

In the face of such complex rules, our apparently plausible question will be: why is it that historical cost concept rests upon such an ambiguous normality rule and does not simply reflect actual cash expenditure ?

Our answer: such abnormal physical consumptions or abnormally high portion of acquisition outlay could have been avoided by a more careful business activity. In this sense, such losses are exhaustions of the firm's wealth and may well be regarded as "not-yet-losses-under-stationariness". In other words, we will be justified in considering that the firm's wealth has decreased, *mutas mutandis*, by the amount of such abnormal losses. This interpreation inevitably leads to the necessity of charging those abnormal losses to current income statement.

It is anticipated that our negative picture theory still holds much more potential in advancing our understanding of conventional accounting system.

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1) Sidney Davidson (ed.), *Handbook of Modern Accounting*, Mcgraw-Hill, New York 1970, P. 38–21.

2) Idem., P. 17–18.

STABILITY OF THE DEMAND FOR MONEY : AUSTRALIAN EXPERIENCES

Kenichi ISHIGAKI

I Introduction

Australian monetary authorities have adopted money supply control policy in order to depress high inflation rate since 1976. The treasurer publishes in the budget speech a monetary target (projection) in form of a zone of the growth rate of M 3. The Reserve Bank has endeavored to control monetary aggregates, especially M 3, within the zone through monetary instruments, mainly direct control on the banking sector.

However, this money supply control policy has some problems. Firstly, this policy theoretically is based on the stability of the demand for money or the velocity of circulation of money. However, the stability is not self-evident, but should be ascertained empirically.

Secondly, this policy assumes high controlability of the money supply by monetary authorities. However, the Australian financial system was not necessarily adequate for the control of the money supply. Interest rates of government securities were not freely determined by the market force, but controlled by monetary authorities. The exchange rate was also determined by monetary authorities. This situation means that money supply control will be disturbed by fiscal conditions and the balance of payment.

Thirdly, the implementation of monetary policy did not necessarily coordinate with fiscal policy and exchange rate policy. A large government budget deficit put pressure upon money supply and caused to overshoot it above the target zone. Exchange rate policy was assigned not to equilibrium of balance of payment but to reduction of the inflation rate, therefore the monetary base tends to move very erraticically and made it difficult to control the money supply. The main purpose of this paper is to estimate the demand for money function and ascertain whether the function is stable or not. That is the first problem of the above three.

II A Model of the Demand for Money Function

The stability of the demand for money is one of main disputes between the Keynesians and the Monetarists. Since M. Friedman restated the quantity theory of money[1)] as a theory of the demand for money, many economists have attempted to

study the demand for money function empirically in advanced countries like the USA, U.K., Japan etc[2]. Some economists found that the demand for money functions were not as stable as monetarists have asserted. In Australia, there were some empirical studies of the demand for money function[3], however we can not find empirical studies which dealt with this problem in the period from the last half of the 70's to the beginning of the 80's.

The demand for money function is as follows :

$$\frac{M}{P} = \frac{M^d}{P}(y, R, R_d, IR^e) \cdots\cdots (1)$$

One important problem is whether the demand function should be treated in nominal or real terms. We treat it in real terms because people want to have money in terms of the purchasing power of money and also a demand function and a supply function should be identified separately in order to minimize the estimation bias. Usually the money supply, whether it is controlled strictly by monetary authorities or depends on the interest rate and loans by banking institutions, is treated as nominal money. Therefore we may evade the identification problem if we treat the demand function in real term.

In (1) equation, the independent variables are real income (y), nominal interest rates (R), own rate of return on money (R_d) and the expected inflation rate (IR^e). Almost all economist except strict monetarists admit the first two variable, y, R, are included in a demand for money function. One related problems is which interest rate should be included in the model. Four interest rates—short term (three month treasury note) R_T, medium term (two year treasury bond) R_s, long term (twenty year treasury bond) R_L, and own rate of return on money (interest rate of time deposit with maturity three month to less than six month) R_d—are used in the regression equation.

The expected inflation rate is also included in the regression equation. According to economic theory, nominal interest rates moves with the expected rate of inflation. However, the nominal interest rate might not reflect exactly the expected movement of inflation,and expected inflation will make effects not only through the nominal interest rate, but also directly on the demand for money because of substitution between money and real assets.

The other problem of estimation of the demand for money is the adjustment lag problem. The desired demand for money function is written as follows :

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1) M. Friedman [5].

2) Goldfeld [6], [7], Laidler [15] in U.S.A. Artis and Lewis [1], Goodhart [8], Laidler and Parkin [16], Hamburger [10] in U.K. Tsutsui and Hatanaka [22] in Japan. OECD [19], Boughton [2] in advanced countries.

3) Davis and Lewis [4], Lewis [17], Norman and Purvis [18].

$$Log(\frac{M}{P})_t^* = \alpha_0 + \beta_0 Log\, y_t + \beta_1 Log\, R_t \cdots\cdots (2)$$

If variables on the right hand side of equation (2) change, desired demand for money $(\frac{M}{P})^*$ is not necessarily met instantaneously, but the adjustment is rather slow as follows :

$$Log(\frac{M}{P})_t - Log(\frac{M}{P})_{t-1} = \lambda\, [\, Log(\frac{M}{P})_t^* - Log(\frac{M}{P})_{t-1}\,] \cdots\cdots (3)$$

λ is the adjustment speed and $1>\lambda>0$. Substituting (2) into (3), we get equation (4) :

$$Log(\frac{M}{P})_t = \alpha_0 \lambda + \beta_0 \lambda\ Log\, y_t + \beta_1 \lambda\ Log\, R_t + (1-\lambda)\, Log(\frac{M}{P})_{t-1} \cdots\cdots (4)$$

$$\beta_0>0,\ \ \beta_1<0,\ \ 1>\lambda>0$$

We call equation (4) the basic model and equation (5) the enlarged model.

$$Log(\frac{M}{P})_t = \alpha_0 \lambda + \beta_0 \lambda\ Log\, y_t + \beta_1 \lambda\ Log\, R_t + \beta_2 \lambda\ Log\, R_{dt} + \beta_3 \lambda\ IR_t^e + (1-\lambda)\, Log(\frac{M}{P})_{t-1} \cdots\cdots (5)$$

(i) in $\frac{M_1}{P}$ case, $\beta_0>0,\ \beta_1<0,\ \beta_2<0,\ \beta_3<0$

(ii) in $\frac{M_3}{P}$ case, $\beta_0>0,\ \beta_1<0,\ \beta_2 \lessgtr 0,\ \beta_3<0$

(iii) in $\frac{STD}{P}$ case, $\beta_0>0,\ \beta_1<0,\ \beta_2>0,\ \beta_3<0$

We assume that IR_t^e is equal to inflation rate at period t.

We use three monetary aggregates, M_1, M_3, and STD. M_1 is composed of currency in circulation and demand deposits of trading banks. STD is time deposits of trading banks and deposits of savings banks. M_3 is equal to M_1 plus STD.

III Estimation of the Demand for Money Function (1)—Basic Model—

The demand for money functions will be estimated for the following four periods, [1961·Ⅲ～1982·Ⅳ], [1961·Ⅲ～69·Ⅳ, 70·Ⅰ～79·Ⅳ], [1961·Ⅲ～1973·Ⅳ, 1974·Ⅰ～1982·Ⅳ], [1961·Ⅲ～1975·Ⅳ, 1976·Ⅰ～1982·Ⅳ]. The first period [61·Ⅲ～82·Ⅳ] is the whole period with which we are concerned. The second one is divided by 1970. The third period [61·Ⅲ～73·Ⅳ, 74·Ⅰ～82·Ⅳ] is divided by the first oil shock. The fourth period [61·Ⅲ～75·Ⅳ, 76·Ⅰ～82·Ⅳ] is divided by the change of the

Table 1. Estimation of the Demand for Money Function [1961· III ~1982·IV]

$\mathrm{Log}(\frac{M_1}{P})$	const	Log y	Log R_T	Log R_S	Log R_L	Log Rd	IR^e	Log( )$_{-1}$	$R^2/S\cdot E$	$d\cdot w/\rho$	h	E. N.*
61·III~82·IV	−0.140	0.137	−0.067					0.775	0.876	2.026	0.143	I-1
	(−0.60)	(4.70)	(−5.04)					(13.06)	0.017	0.331		
	−0.245	0.159		−0.082				0.759	0.867	2.059	0.334	I-2
Basic Model	(−0.97)	(5.00)		(−5.23)				(12.50)	0.017	0.367		
	−0.207	0.170			−0.094			0.735	0.832	2.046	0.269	I-3
	(−0.69)	(4.35)			(−4.28)			(10.949)	0.017	0.420		
61·III~82·IV	−0.240	0.192	−0.033			−0.048	−0.001	0.690	0.845	2.058	0.352	I-4
	(−0.84)	(5.25)	(−1.16)			(−1.49)	(−1.22)	(9.713)	0.017	0.422		
	−0.278	0.211		−0.046		−0.046	−0.001	0.664	0.820	2.09	0.583	I-5
Enlarged Model	(−0.86)	(5.39)		(−1.19)		(−1.22)	(−1.09)	(8.77)	0.017	0.474		
	−0.074	0.313			0.015	−0.134	−0.001	0.423	0.538	2.039	0.313	I-6
	(−0.14)	(5.13)			(0.28)	(−3.33)	(−0.92)	(4.78)	0.017	0.422		
$\mathrm{Log}(\frac{M_3}{P})$												
61·III~82·IV	−0.622	0.227	−0.043					0.740	0.993	1.956	0.229	I-7
	(−4.15)	(5.38)	(−5.2)					(14.49)	0.014	0.059		
	−0.709	0.244		−0.051				0.729	0.993	1.972	0.146	I-8
Basic Model	(−4.51)	(5.69)		(−5.50)				(14.30)	0.014	0.016		
	−0.708	0.257			−0.056			0.710	0.992	1.967	0.173	I-9
	(−3.70)	(5.08)			(−4.32)			(12.36)	0.014	0.102		
61·III~82·IV	−0.595	0.205	−0.056			0.017	−0.0003	0.772	0.993	1.955	0.242	I-10
	(−3.83)	(4.43)	(−2.97)			(0.81)	(−0.59)	(13.04)	0.014	0.032		
	−0.653	0.207		−0.082		0.038	−0.0003	0.782	0.994	1.974	0.140	I-11
Enlarged Model	(−4.36)	(4.75)		(−3.82)		(1.76)	(−0.56)	(14.05)	0.014	0.0004		
	−0.688	0.264			−0.045	−0.011	0.0003	0.694	0.991	1.964	0.203	I-12
	(−3.47)	(4.95)			(1.27)	(−0.42)	(0.55)	(10.97)	0.015	0.105		
$\mathrm{Log}(\frac{STD}{P})$												
61·III~82·IV	−0.644	0.148	−0.056			0.036	−0.0003	0.860	0.996	2.012	0.600	I-13
	(−2.75)	(3.32)	(−2.79)			(1.59)	(−0.45)	(20.59)	0.018	−0.083		
	−0.768	0.168		−0.097		0.061	−0.0002	0.853	0.996	2.018	0.01	I-14
Enlarged Model	(−3.38)	(3.93)		(−3.80)		(2.61)	(−0.34)	(21.76)	0.017	−0.11		
	−0.894	0.206			−0.078	0.030	0.0005	0.812	0.995	2.017	0.02	I-15
	(−3.05)	(3.77)			(−1.92)	(1.05)	(0.69)	(17.86)	0.018	−0.083		

* Equation Number

Data : *IMF, International Financial Statistics. Reserve Bank of Australia, Bulletin.*

Australian monetary policy from Keynesian to monetarist in 1976.

We will estimate the demand for money function and assess the degree of stability based on the whole regression result, that is sign and value of coefficient and statistics of regression, chow test and prediction.

(1) The Longrun Demand for Money function (61·Ⅲ~82·Ⅳ)

The regression results of M_1 and M_3 on the basis model in 61·Ⅲ~82·Ⅳ period are shown in Table 1. We got good regression results. Sign and values of coefficient are good and also statistics like t value, adjusted R^2, standard error (S.E.), Durbin-Watson statistics ($d \cdot w$), h value show very good results. Long-run elasticities of the demand for money with respect to income and interest rate are shown in Table 2. Comparing regression results of M_3 with results of M_1, it seems that the former regression is better than the latter one.

(2) 60's (61·Ⅲ~69·Ⅳ) and 70's (70·Ⅰ~79·Ⅳ)

Table 2. Long Run Elasticity of Demand for Money with y, R. [1961·Ⅲ~1982·Ⅳ]

Model	independent v. / dependent v.	y	R_T	R_S	R_L	Rd
Basic Model	M_1/P	0.61	−0.30			*
		0.66		−0.34		*
		0.64			−0.36	*
	M_3/P	0.87	−0.17			*
		0.90		−0.19		*
		0.89			−0.19	*
Enlarged Model	M_1/P	0.62	−0.11			−0.15
		0.63		−0.14		−0.14
		0.54			0.03	−0.23
	M_3/P	0.90	−0.25			0.07
		0.95		−0.38		0.17
		0.86			−0.15	−0.04
	STD/P	1.06	−0.40			0.26
		1.14		−0.66		0.42
		1.10			−0.42	0.16

Table 3 shows good regression results in both 60's and 70's, all statistics are satisfactory. Regression results do not depend upon selection of interest rate.

Comparing the regression in the 60's with one in the 70's, we found that the long-run elasticity of income and interest rates increased in the 70's, and the adjustment speed (λ) became larger and fitness of regression of both M_1 and M_3 declined.

Do these changes imply structural change of the demand for money function ? In order to determine this , we did the chow test and found null hypothesis that structural change did not occure was not rejected except R_S case in M_1 regression (Table 4). This finding may be satisfactory to monetarists who believe in the stability of the demand for money function. However, the result of the chow test depend upon the period, so that it does not necessarily mean that structural change did not occure during 70's.

Table 3. Basic Model [1961· III ~69·IV, 70·I~79·IV]

$\mathrm{Log}(\frac{M_1}{P})$	const	Log y	Log R_T	Log R_S	Log R_L	Log $(\frac{M}{P})_{-1}$	$R^2/S\cdot E$	$d\cdot w/\rho$	h	E. N.
61·III~69·IV	0.217	0.138	−0.071			0.700	0.900	1.792	0.825	II-1
	(0.67)	(2.60)	(−1.98)			(5.60)	0.013	0.048		
	0.132	0.100		−0.066		0.794	0.922	1.812	0.550	II-2
	(0.46)	(2.55)		(−2.29)		(7.50)	0.013	−0.078		
	0.177	0.085			−0.069	0.818	0.909	1.829	0.628	II-3
	(0.57)	(2.05)			(−1.47)	(7.32)	0.013	−0.039		
70·I~79·IV	−1.129	0.254	−0.108			0.748	0.885	1.941	0.195	II-4
	(−2.08)	(5.08)	(−6.68)			(12.58)	0.017	0.074		
	−1.245	0.264		−0.122		0.760	0.854	1.956	0.151	II-5
	(−1.97)	(4.52)		(−5.86)		(11.58)	0.018	0.162		
	−0.981	0.275			−0.156	0.701	0.766	1.905	0.185	II-6
	(−1.198)	(3.38)			(−4.16)	(8.19)	0.019	0.296		
$\mathrm{Log}(\frac{M_3}{P})$										
61·III~69·IV	−0.525	0.173	−0.024			0.809	0.996	2.027	0.091	II-7
	(−2.05)	(2.43)	(−1.24)			(10.03)	0.009	−0.191		
	−0.499	0.170		−0.028		0.811	0.996	2.079	0.351	II-8
	(2.02)	(2.47)		(−1.57)		(10.64)	0.009	−0.224		
	−0.569	0.194			−0.051	0.791	0.997	2.095	0.328	II-9
	(−2.34)	(2.91)			(−2.001)	(11.06)	0.009	−0.239		
70·I~79·IV	−1.207	0.273	−0.065			0.765	0.920	1.998	0.007	II-10
	(−2.69)	(4.15)	(−4.54)			(9.40)	0.017	−0.036		
	−1.254	0.273		−0.075		0.773	0.913	1.979	0.736	II-11
	(−2.63)	(4.02)		(−4.31)		(9.18)	0.018	−0.001		
	−0.945	0.277			−0.072	0.721	0.865	1.960	0.162	II-12
	(−1.52)	(3.19)			(−2.52)	(7.07)	0.020	0.103		

Table 4. Chow Test (Basic Model)

		M_1			M_3		
		R_T	R_S	R_L	R_T	R_S	R_L
61·Ⅲ～69·Ⅳ 70·Ⅰ～79·Ⅳ	F値	1.89	2.36*	1.83	1.31	1.06	0.37
61·Ⅲ～73·Ⅳ 74·Ⅰ～82·Ⅳ	F値	4.25**	5.88**	2.72*	5.93**	5.85**	4.82**
61·Ⅲ～75·Ⅳ 76·Ⅰ～82·Ⅳ	F値	6.02**	4.80**	4.05**	4.38**	2.94*	2.69*

* significant at five percent level
** significant at one percent level

(3) Pre-Oil Shock Period (61·Ⅲ～73·Ⅳ) and After-Oil Shock Period (74·Ⅰ～82·Ⅳ)

The oil shock at the end of 1973 deeply affected the world economy. It seems that the Australian economy was also effected by the shock, so we should ascertain whether the real side shock (oil shock) destabilized the demand for money function or not.

Table 5 shows the regression results of both period. The regressions in pre-oil shock period are rather good, especially in the case of R_T(Ⅲ-1, Ⅲ-7). However, the regression results in after-oil shock period changed considerably. The demand for M_1 function (Ⅲ-4) is rather good, but R^2 declined considerablly. The demand for M_3 function (Ⅲ-10～Ⅲ-12) changed rather drastically. Firstly, signs of each interest rate are not clear. Secondly, the adjustment speed (λ) increased greatly. It means that economic instability and high inflation by monetary disturbance and the oil shock sped up the adjustment of money holding. These changes suggest that structural change of demand for money function might occur between pre-oil shock period and after-oil shock period. This was ascertained by the chow test (Table 4). The demand for money functions reflect also the structural change of real side of the economy. Figure 1 (a), (b) shows comparison between actual and predicted demand for money. The accuracy of prediction is shown by RMSPE (root–mean–square–percentage–error) and it shows the same level of prediction for M_1 and M_3.

(4) Pre-Monetary Policy Change Period (61·Ⅲ～75·Ⅳ) and After Its Change Period (75·Ⅰ～82·Ⅳ)

One of the debates on the demand for money function is whether change of mode of monetary policy affects it. N.Kaldor and C.A.E.Goodhart argued that its change would induce big effects on the stability and predictability of demand for money function[4]. Australia monetary policy changed drastically from Keynesian to monetarist. We should examine whether this policy change affected the demand for money function.

4) Kaldor [13], Goodhart [8], [9].

Table 5. Basic Model [61· III ~73·IV, 74·I~82·IV]

$\mathrm{Log}(\frac{M_1}{P})$	const	Log y	Log R_T	Log R_S	Log R_L	Log $(\frac{M}{P})_{-1}$	$R^2/S\cdot E$	$d\cdot w/\rho$	h	E. N.
61·III~73·IV	−0.247	0.106	−0.078			0.862	0.978	1.874	0.485	III-1
	(−1.90)	(4.06)	(−5.13)			(14.42)	0.013	−0.180		
	−0.353	0.077		−0.072		0.942	0.977	1.919	0.309	III-2
	(−2.40)	(3.09)		(−4.54)		(15.45)	0.014	−0.205		
	−0.463	0.083			−0.091	0.961	0.969	1.873	0.510	III-3
	(−2.23)	(2.86)			(−3.40)	(13.41)	0.014	−0.101		
74·I~82·IV	−2.727	0.341	−0.103			0.888	0.764	1.892	0.423	III-4
	(−2.69)	(3.34)	(−3.69)			(7.98)	0.019	0.245		
	−3.579	0.452		−0.151		0.854	0.803	1.952	0.175	III-5
	(−3.73)	(4.49)		(−5.01)		(8.67)	0.017	0.284		
	−2.379	0.396			−0.128	0.720	0.640	1.911	0.488	III-6
	(−1.86)	(2.80)			(−2.76)	(5.62)	0.019	0.435		
$\mathrm{Log}(\frac{M_3}{P})$										
61·III~73·IV	−0.309	0.078	−0.054			0.938	0.998	1.938	0.227	III-7
	(−2.88)	(2.26)	(−5.19)			(21.93)	0.010	−0.246		
	−0.346	0.096		−0.048		0.912	0.997	1.929	0.260	III-8
	(−2.76)	(2.45)		(−4.03)		(18.99)	0.010	−0.148		
	−0.509	0.154			−0.055	0.848	0.995	1.921	0.297	III-9
	(−2.82)	(3.04)			(−2.72)	(14.80)	0.010	0.002		
74·I~82·IV	0.514	0.387	−0.014			0.282	0.750	2.108	0.798	III-10
	(0.57)	(4.80)	(−0.64)			(1.83)	0.016	0.097		
	0.031	0.414		−0.033		0.321	0.753	2.108	0.798	III-11
	(6.03)	(5.03)		(−1.22)		(2.08)	0.016	0.108		
	1.029	0.366			0.020	0.228	0.742	2.104	0.623	III-12
	(1.22)	(4.29)			(0.07)	(1.56)	0.016	0.097		

Figure 1 (a). Actual Value and Predicted Value [M_1] [74·I~75·IV]

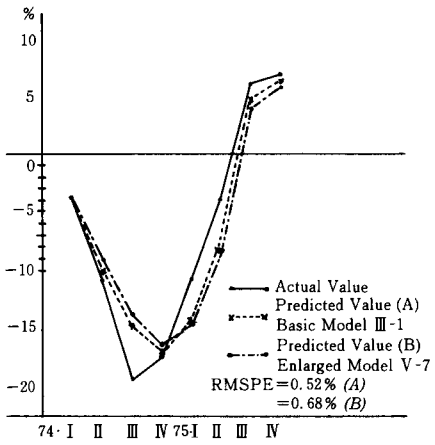


Figure 1 (b). Actual Value and Predicted Value [M_3] [74·I~75·IV]

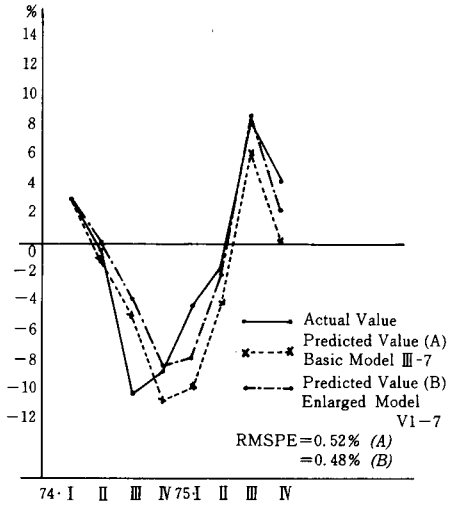


Table 6 shows that fitness of the regression of M_1 and M_3 in pre-monetary policy change (61·III~76·IV) is very good, especially in case of R_T (IV-1, IV-7). On the other hand, the fitness of regression of M_1 and M_3 in after-monetary policy change (1976·I~1982·IV) declined very drastically. Firstly, the adjustment speed (λ) changed very much. The adjustment speed of (IV-2) in the pre-monetary policy change is 0.27, which means people adjust a part, that is 27% of the differences between desired money stock and actual one. However, the adjustment speed of M_1 and M_3 in after-period does not statisfy $1 > \lambda > 0$ condition. In case of M_1, λ is negative value, and λ is larger than 1 in case of M_3. This may indicate money supply control policy made the structure of the demand for money function change drastically. Secondarily, the estimated coefficients of interest rates also change drastically. The coefficients of interest rates of M_1 and M_3 in pre-period met the sign condition and t test. However, the coefficients of interest rate of demand for M_3 function in the after-period are not satisfactory, because the sign is positive in some case (R_S case) and t values are not significant in all case. Thirdly, the statistics like $R^2, S \cdot E, d \cdot w$ and h in after-period are not satisfactory in comparison with the results of pre-period regression.

Table 6. Basic Model [61· III ~75·IV, 76·I~82·IV]

$\mathrm{Log}(\frac{M_1}{P})$	const	Log y	Log R_T	Log R_S	Log R_L	$\mathrm{Log}(\frac{M}{P})_{-1}$	$R^2/S\cdot E$	$d\cdot w/\rho$	h	E. N.
61·III~75·IV	−0.165	0.176	−0.103			0.713	0.955	1.922	0.321	IV-1
	(−1.07)	(6.83)	(−8.01)			(13.40)	0.015	0.044		
	−0.219	0.175		−0.107		0.730	0.924	1.972	0.121	IV-2
	(−1.03)	(5.40)		(−5.98)		(11.26)	0.016	0.207		
	−0.178	0.223			−0.132	0.636	0.829	2.021	0.112	IV-3
	(−0.50)	(4.16)			(−3.72)	(7.09)	0.018	0.435		
76·I~82·IV	−2.395	0.206	−0.084			1.092	0.892	1.340	1.990	IV-4
	(−1.66)	(1.29)	(−2.82)			(11.17)	0.017	0.022		
	−3.056	0.297		−0.117		1.054	0.939	1.265	2.090	IV-5
	(−3.05)	(2.50)		(−4.96)		(13.76)	0.014	−0.157		
	−1.964	0.174			−0.111	1.09	0.962	1.419	1.580	IV-6
	(−3.18)	(2.27)			(−6.86)	(17.96)	0.012	−0.297		
$\mathrm{Log}(\frac{M_3}{P})$										
61·III~75·IV	−0.667	0.207	−0.055			0.784	0.993	1.964	0.154	IV-7
	(−3.92)	(4.03)	(−5.06)			(12.43)	0.014	−0.001		
	−0.749	0.232		−0.061		0.759	0.992	1.961	0.165	IV-8
	(−3.99)	(4.24)		(−4.67)		(11.44)	0.014	0.049		
	−0.892	0.294			−0.066	0.684	0.989	1.954	0.213	IV-9
	(−3.50)	(4.33)			(−3.23)	(8.92)	0.015	0.127		
76·I~82·IV	1.552	0.507	−0.023			−0.098	0.851	1.502	59.44	IV-10
	(1.53)	(4.11)	(−1.11)			(−0.51)	0.010	0.159		
	0.664	0.551		0.003		−0.021	0.855	1.478	×	IV-11
	(0.68)	(4.74)		(0.14)		(−0.10)	0.010	0.191		
	0.493	0.556			−0.002	0.000	0.857	1.488	×	IV-12
	(0.64)	(4.92)			(−0.09)	(0.00)	0.010	0.159		

These changes suggest that some structural change might haved occured between the two periods. The results are ascertained by chow test. The null hypothesis that there was no structural change between two periods was rejected at the 1 percent level (in case M_1 and in R_T case of M_3) and 5 percent level (in the R_S and R_L case of M_3) as shown in Table 4.

Figure 2 (a), (b) show the result of prediction by using regression equation (Ⅳ-1) and (Ⅳ-7). In comparison with the accuracy of the prediction of M_1 and M_3 by RMSPE, M_3 is better than M_1. And also comparing with the prediction of 74–75 case, the accuracy of prediction of this case is better than 74–75 case.

These Regression Results by the basic model, as shown above, suggest that the real side shock at the end of 1973 and the change of mode of monetary policy in 1976 affected the demand for money and destabilized it.

Figure 2 (a). Actual Value and Predicted Value of M. [76·Ⅰ~77·Ⅳ]

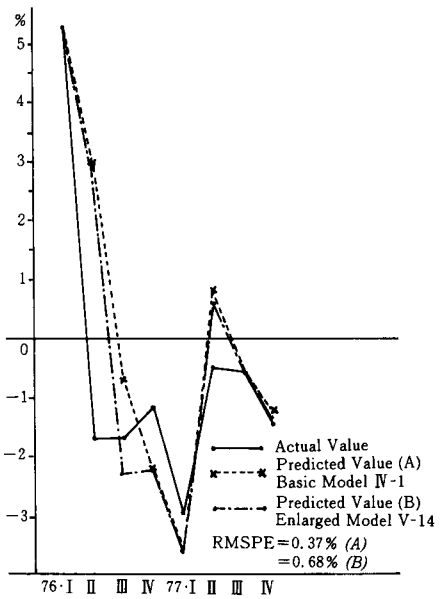
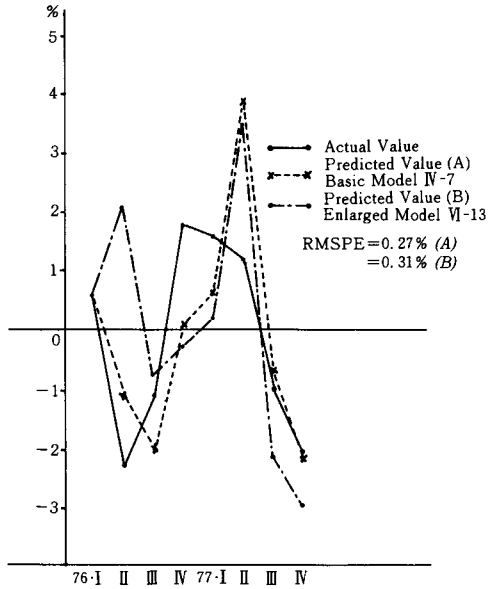


Figure 2 (b). Actual Value and Predicted Value of M_3 [76·Ⅰ~77·Ⅳ]



IV Estimation of the Demand for Money Function (2) —An Enlarged Model—

In this section, we estimate the demand for money function by using equation (5)[5]. A feature of this model is, in comparison with the basic model, that it includes own rate of return on money, e.g interest rate on time and saving deposits (R_d) and expected inflation rate (IR^e). However, the inclusion of R_d in the model may add some ambiguity to the sign of R in case of M_3 regression because the demand for M_1 (a component of M_3) have negative sign to R_d, but the demand for *STD* (the other component of M_3) have positive sign to R_d, and both T and R_d tend to move toward the same direction. In order to evade this ambiguity, we will also estimate the demand for the *STD* function.

We estimated this model in the same periods as the basic model. These results are shown in the Table 7～9 and are similar to the results of the basic model. The tables and the Table 10 (Chow Test) show that structural change of regression equation and destabilization of demand for money, M_1, M_3 and *STD* by the oil shock and the change of mode of monetary policy.

We should examine effects on the demand for money regression of R_d and IR^e. The sign of coefficients of R_d of M_1 regression in the whole period (Ⅰ-4～Ⅰ-6 in Table 1) is negative and the t values are not so bad. The sign of coefficient of R_d of *STD* regression (Ⅰ-13～Ⅰ-15) is positive as the theoretical relation implies. However, regression results of R_d of M_3 regression are not good, and the sign is ambiguous. These results are similar to the results in other periods. This ambiguity of the sign reflects the fact that M_3 is composed of M_1 and *STD*.

We should further note that t values of almost all coefficient of interest rate (R_T, R_S, R_L) in the enlarged model are very low in comparison with the basic model. This results suggest that there is some multicollinearity between R and R_d because both interest rates tend to move simultaneously toward same direction.

The regression results for the expected inflation rate (IR^e) are not satisfactory as a whole because even sign conditions except a few case are not met and t values are too low. This may imply that the expected inflation rate will be reflected on the nominal interest rates and it will affect the demand for money not directly but through the nominal interest rate[6].

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5) We also estimated following model :

$$\mathrm{Log}(\frac{M}{P})_t = \lambda\ \alpha + \lambda\ \beta_0\ Log\, y_t + \lambda\ \beta_1\ Log\, R_t + \lambda\ \beta_2\ IR_t^e + (1-\lambda)\ Log(\frac{M}{P})_{-1}$$

and $$Log(\frac{M}{P})_t = \lambda\ \alpha + \lambda\ \beta_0\ Log\, y_t + \lambda\ \beta_1\ Log\, R_t + \lambda\ \beta_2\ Log\, R_{dt} + (1-\lambda)\ Log(\frac{M}{P})_{-1}$$

The results are very similar to results of the basic model and the enlarged model.

V Summary

We summarize our findings on the Australian demand for money function in various periods as follows.

(1) Interest Rates (R) are important in the demand for money function, however the long-run elasticity of demand for real money with respect to interest rates is not so large.

(2) In general, in estimating the demand for money function, the regression result of short term interest rate (R_T) is best of the three interest rates, and fitness of longer term interest rate declines. These results mean that the short term asset (treasury note in this case) has the highest substitutability for money of the three financial assets.

(3) Own rate of return on money (interest rate on Savings and Time deposit) also affects the demand for money function, however its effects on M_3 are ambiguous because of the nature of M_3.

(4) Real income also is very important in the demand for money function. The long-run elasticities of demand for money (M_1, M_3) with respect to real income are less than 1 and the elasticity of STD is larger than 1. However, the short-term elasticity varies widely.

(5) The expected inflation rate does directly affect the demand for money. It seems mainly to affect the demand function through the nominal interest rate. In other word, the substitution between real money and real assets is not so high.

(6) The regression results for the long-run demand for money function is very good. However, this result does not necessarily mean that a structural change in the demand function did not occur. The oil shock and change of mode of monetary policy in mid 70's certainly destabilized the demand for money function. It seems that the demand for money function is not as stable as monetarists assert.

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6) This result clearly depend upon the assumption of expected inflation rate. We assume it as $IR^e = 100 \times (P_t - P_{t-4})/P_{t-4}$. However, if we assume it as $IR^e = 4 \times 100 \times (P_t - P_{t-1})/P_{t-1}$, we got the following result in the whole period.

$$Log\left(\frac{M_1}{P}\right) = \underset{(-1.39)}{-0.351} + \underset{(5.26)}{0.117}\ Log\,y - \underset{(-1.17)}{0.303}\ Log\,R_t - \underset{(-1.63)}{0.046}\ Log\,R_{dt} - \underset{(-4.60)}{0.002}\ IR_t^e + \underset{(10.97)}{0.742}\ Log\left(\frac{M_1}{P}\right)_{t-1} \qquad (R^2 = 0.863.\ d \cdot w = 2.099)$$

$$Log\left(\frac{M_3}{P}\right) = \underset{(-3.94)}{-0.653} + \underset{(3.28)}{0.160}\ Log\,y - \underset{(-3.62)}{0.061}\ Log\,R_t + \underset{(1.54)}{0.285}\ Log\,R_{dt} - \underset{(-7.48)}{0.002}\ IR_t^e + \underset{(13.93)}{0.855}\ Log\left(\frac{M_3}{P}\right)_{t-1} \qquad (R^2 = 0.991,\ d \cdot w = 1.950)$$

Table 7. Enlarged Model [$\frac{M_1}{P}$]

$\mathrm{Log}(\frac{M_1}{P})$	const	Log y	Log R_T	Log R_S	Log R_L	Log R_d	IR^e	Log( )$_{-1}$	R^2	$R^2/S\cdot E$	$d\cdot w/\rho$	h	E. N.
61·Ⅲ~69·Ⅳ	0.486	0.024	0.170			−0.259	−0.003	0.969	0.949	1.858		0.538	V-1
	(0.20)	(0.45)	(1.96)			(−2.82)	(−1.68)	(8.51)	0.012	−0.276			
	0.889	0.132		0.064		−0.166	−0.004	0.749	0.907	1.766		0.895	V-2
	(0.27)	(2.78)		(0.67)		(−1.54)	(−1.59)	(6.52)	0.013	0.039			
	0.156	0.134			0.122	−0.176	−0.004	0.713	0.910	1.751		0.929	V-3
	(0.48)	(2.94)			(1.41)	(−2.70)	(−1.86)	(6.35)	0.012	0.048			
70·Ⅰ~79·Ⅳ	−1.342	0.339	−0.060			−0.087	0.0007	0.631	0.857	1.904		0.376	V-4
	(−2.13)	(4.52)	(−1.74)			(−1.55)	(0.60)	(6.53)	0.017	0.198			
	−1.427	0.381		−0.041		−0.132	0.001	0.579	0.810	1.865		0.569	V-5
	(−1.91)	(4.50)		(−0.87)		(−2.07)	(1.07)	(5.25)	0.017	0.317			
	−1.300	0.403			0.044	−0.213	0.002	0.494	0.795	1.751		0.985	V-6
	(−1.66)	(4.69)			(0.62)	(−3.43)	(1.71)	(5.00)	0.017	0.350			
61·Ⅲ~73·Ⅳ	−0.128	0.097	−0.043			−0.048	0.001	0.859	0.978	1.846		0.646	V-7
	(−0.53)	(3.53)	(−1.15)			(−0.96)	(0.96)	(10.91)	0.013	−0.192			
	−0.148	0.083		−0.007		−0.091	0.001	0.892	0.977	1.846		0.628	V-8
	(−0.59)	(3.38)		(−0.20)		(−1.90)	(1.15)	(11.98)	0.014	−0.186			
	−0.098	0.082			0.019	−0.114	0.001	0.883	0.977	1.837		0.668	V-9
	(−0.37)	(3.25)			(0.42)	(−2.87)	(1.11)	(11.57)	0.014	−0.178			
74·Ⅰ~82·Ⅳ	−3.306	0.643	−0.012			−0.147	−0.001	0.407	0.468	1.827		1.416	V-10
	(−1.51)	(2.74)	(−0.27)			(−2.38)	(−0.48)	(2.58)	0.019	0.752			
	−3.916	0.465		−0.175		0.019	0.0004	0.897	0.814	1.937		0.269	V-11
	(−3.07)	(3.31)		(−3.00)		(0.36)	(0.27)	(7.23)	0.017	0.225			
	−3.306	0.653			0.028	−0.172	−0.001	0.369	0.469	1.767		1.778	V-12
	(−1.49)	(2.83)			(0.32)	(−2.49)	(−0.43)	(2.37)	0.019	0.751			
61·Ⅲ~75·Ⅳ	−0.168	0.157	−0.125			0.268	0.0002	0.749	0.961	1.914		0.359	V-13
	(−0.95)	(5.85)	(−5.05)			(0.83)	(0.17)	(13.07)	0.015	0.039			
	−0.347	0.215		−0.071		−0.060	0.001	0.617	0.885	1.999		0.010	V-14
	(−0.11)	(4.95)		(−1.66)		(−1.27)	(0.64)	(8.67)	0.016	0.362			
	0.250	0.280			0.041	−0.164	0.0002	0.421	0.771	1.893		0.602	V-15
	(0.54)	(4.61)			(0.61)	(−3.38)	(0.16)	(4.26)	0.017	0.579			
76·Ⅰ~82·Ⅳ	−1.935	0.192	−0.011			−0.070	−0.002	1.031	0.962	1.608		1.136	V-16
	(−2.13)	(1.78)	(−0.31)			(−2.27)	(−1.91)	(11.95)	10.012	−0.308			
	−2.096	0.205		−0.033		−0.055	−0.002	1.040	0.964	1.626		1.056	V-17
	(−2.43)	(1.93)		(−0.86)		(−1.81)	(−2.06)	(13.76)	0.012	−0.322			
	−1.729	0.159			−0.052	−0.038	−0.002	1.063	0.964	1.609		1.128	V-18
	(−2.20)	(1.50)			(−0.96)	(−0.88)	(−1.41)	(12.56)	0.012	−0.323			

Table 8. Enlarged Model [$\frac{M_3}{P}$]

$\mathrm{Log}(\frac{M_3}{P})$	const	Log y	Log R_T	Log R_S	Log R_L	Log R_d	IR^e	Log( )$_{-1}$	$R^2/S\cdot E$	$d\cdot w/\rho$	h	E. N.
61·Ⅲ～69·Ⅳ	−0.491	0.181	−0.467			−0.085	−0.001	0.794	0.796	2.062	0.205	Ⅵ-1
	(−1.88)	(2.46)	(0.86)			(−1.43)	(−0.88)	(9.10)	0.009	−0.170		
	−0.515	0.176		0.026		−0.067	−0.001	0.817	0.996	2.625	0.085	Ⅵ-2
	(−1.99)	(2.33)		(0.40)		(−0.89)	(−0.74)	(9.725)	0.009	−0.183		
	−0.561	0.187			−0.042	−0.087	0.0003	0.801	0.996	2.085	0.287	Ⅵ-3
	(−2.11)	(2.37)			(−0.72)	(−0.18)	(−0.21)	(9.00)	0.009	−0.233		
70·Ⅰ～79·Ⅳ	−1.063	0.280	−0.077			0.013	0.001	0.729	0.925	2.007	0.035	Ⅵ-4
	(−2.13)	(3.00)	(−2.68)			(0.32)	(0.67)	(6.51)	0.018	−0.076		
	−1.085	0.269		0.097		0.020	0.001	0.756	0.921	1.977	0.104	Ⅵ-5
	(−2.12)	(2.74)		(−2.53)		(0.46)	(0.56)	(6.23)	0.018	−0.053		
	−1.329	0.418			0.003	−0.086	0.002	0.545	0.870	1.949	0.262	Ⅵ-6
	(−2.06)	(3.89)			(0.05)	(−1.55)	(2.00)	(4.23)	0.019	0.118		
61·Ⅲ～73·Ⅳ	−0.204	0.061	−0.076			0.037	0.001	0.945	0.998	2.019	0.066	Ⅵ-7
	(−1.64)	(1.77)	(−3.07)			(1.13)	(0.74)	(21.45)	0.009	−0.285		
	−0.164	0.077		−0.067		0.028	0.002	0.912	0.997	2.057	0.212	Ⅵ-8
	(−1.31)	(2.22)		(−2.70)		(0.85)	(2.38)	(21.47)	0.010	−0.29		
	−0.337	0.145			−0.076	0.008	0.002	0.837	0.997	2.007	0.030	Ⅵ-9
	(−2.13)	(3.21)			(−2.14)	(0.25)	(3.08)	(16.08)	0.010	−0.226		
74·Ⅰ～82·Ⅳ	1.115	0.355	−0.014			0.010	−0.001	0.237	0.698	2.083	1.434	Ⅵ-10
	(0.88)	(2.96)	(−0.44)			(0.31)	(−0.69)	(1.42)	0.016	0.177		
	−0.214	0.369		−0.077		0.042	−0.0003	0.438	0.779	2.136	1.642	Ⅵ-11
	(−0.174)	(3.48)		(−1.67)		(1.24)	(−0.26)	(2.67)	0.016	0.169		
	−2.480	0.325			0.082	−0.042	−0.002	0.049	0.628	1.937	0.611	Ⅵ-12
	(1.79)	(2.43)			(1.28)	(−0.92)	(−1.23)	(0.31)	0.016	0.329		
61·Ⅲ～75·Ⅳ	−0.407	0.114	−0.108			0.060	0.0000	0.894	0.995	2.022	0.092	Ⅵ-13
	(−2.59)	(2.38)	(−5.00)			(2.29)	(0.11)	(15.07)	0.014	−0.209		
	−0.563	0.165		−0.110		0.047	0.0003	−0.681	0.994	2.014	0.060	Ⅵ-14
	(3.15)	(3.19)		(−3.97)		(1.61)	(0.35)	(−0.32)	0.014	−0.096		
	−0.793	0.283			−0.053	−0.021	−0.001	0.686	0.989	1.953	0.212	Ⅵ-15
	(−2.92)	(4.15)			(−1.06)	(−0.59)	(0.83)	(8.97)	0.015	0.099		
76·Ⅰ～82·Ⅳ	−1.507	0.497	0.0427			−0.022	−0.0004	−0.718	0.848	1.674	×	Ⅵ-16
	(1.47)	(3.98)	(1.47)			(−0.96)	(−0.39)	(−0.36)	0.010	0.160		
	−1.053	0.540		0.029		−0.014	−0.001	−0.068	0.814	1.602	×	Ⅵ-17
	(0.94)	(4.18)		(0.64)		(−0.44)	(−0.91)	(−0.32)	0.010	0.224		
	0.713	0.543			0.024	−0.014	−0.001	−0.017	0.833	1.587	×	Ⅵ-18
	(0.80)	(4.29)			(0.48)	(−0.38)	(−0.90)	(−0.84)	0.060	0.166		

Table 9. Enlarged Model

$\mathrm{Log}(\frac{STD}{P})$	const	Log y	Log R_T	Log R_S	Log R_L	Log R_d	IR^e	Log( )$_{-1}$	$R^2/S\cdot E$	$d\cdot w/\rho$	h	E. N.
61·Ⅲ~69·Ⅳ	−0.460 (−1.08)	0.100 (1.34)	−0.029 (−0.35)			−0.00004 (−0.53)	−0.002 (−0.69)	0.916 (14.26)	0.996 0.014	2.096 −0.269	0.296	Ⅶ-1
	−0.479 (−1.102)	0.109 (1.46)		0.026 (0.27)		−0.058 (−0.51)	0.002 (−0.85)	0.904 (15.12)	0.996 0.014	2.065 −0.241	0.202	Ⅶ-2
	−0.621 (−1.34)	0.140 (1.68)			−0.073 (−0.82)	0.0235 (0.33)	−0.001 (−0.34)	0.626 (4.82)	0.996 0.014	2.116 −0.257	0.359	Ⅶ-3
70·Ⅰ~79·Ⅳ	−1.278 (−1.93)	0.297 (2.59)	−0.075 (−2.34)			0.033 (0.83)	0.001 (1.04)	0.711 (6.02)	0.946 0.020	1.960 −0.075	0.185	Ⅶ-4
	−1.225 (−1.89)	0.278 (2.44)		−0.101 (−2.58)		0.045 (1.10)	0.001 (0.98)	0.742 (6.26)	0.948 0.014	1.917 −0.084	0.383	Ⅶ-5
	−1.609 (−2.17)	0.380 (3.04)			−0.037 (−0.50)	−0.021 (−0.39)	0.002 (1.90)	0.626 (4.82)	0.928 0.022	1.956 0.160	0.235	Ⅶ-6
61·Ⅲ~73·Ⅳ	−0.109 (−0.51)	0.333 (0.87)	−0.118 (−3.41)			0.109 (2.43)	0.0002 (0.18)	0.966 (28.45)	0.998 0.013	2.097 −0.332	0.339	Ⅶ-7
	−0.194 (−0.87)	0.067 (1.72)		−0.098 (−2.89)		0.089 (1.96)	0.001 (1.72)	0.922 (28.66)	0.997 0.013	2.097 −0.296	0.352	Ⅶ-8
	−0.627 (−2.13)	0.156 (3.24)			−0.122 (−2.53)	0.066 (1.55)	0.002 (2.43)	0.856 (21.66)	0.997 0.014	2.088 −0.257	0.321	Ⅶ-9
74·Ⅰ~82·Ⅳ	2.458 (1.86)	0.196 (1.71)	−0.327 (−1.10)			0.082 (2.54)	−0.002 (−1.59)	0.224 (1.45)	0.728 0.181	2.182 0.053	1.302	Ⅶ-10
	1.593 (1.16)	0.237 (2.10)		−0.079 (−1.78)		0.102 (2.98)	−0.002 (−1.35)	0.310 (1.99)	0.758 0.018	2.220 0.017	1.627	Ⅶ-11
	3.512 (2.43)	0.135 (1.056)			0.034 (0.53)	0.048 (1.06)	−0.003 (−1.77)	0.139 (0.88)	0.690 0.018	2.062 0.121	0.508	Ⅶ-12
61·Ⅲ~75·Ⅳ	−0.374 (−1.42)	0.085 (1.73)	−0.101 (−3.85)			0.064 (2.11)	0.0002 (0.21)	0.928 (20.58)	0.996 0.017	2.062 −0.245	0.249	Ⅶ-13
	−0.655 (−2.37)	0.141 (2.81)		−0.108 (−3.51)		0.060 (1.87)	0.0003 (0.27)	0.884 (19.70)	0.996 0.018	2.044 −0.184	0.176	Ⅶ-14
	−1.057 (−2.75)	0.227 (3.34)			−0.104 (−1.89)	0.031 (0.79)	0.001 (0.77)	0.812 (15.38)	0.994 0.019	2.059 −0.120	0.181	Ⅶ-15
76·Ⅰ~82·Ⅳ	3.228 (2.30)	0.215 (1.56)	−0.009 (−0.25)			0.087 (2.485)	−0.002 (−1.58)	0.049 (0.27)	0.761 0.613	1.788 0.201	1.610	Ⅶ-16
	2.848 (2.05)	0.236 (1.87)		−0.035 (−0.69)		0.099 (2.56)	−0.002 (−1.45)	0.082 (0.46)	0.778 0.013	1.802 0.169	1.390	Ⅶ-17
	3.098 (2.66)	0.228 (2.08)			−0.066 (−1.12)	0.123 (2.61)	−0.001 (−0.87)	0.056 (0.32)	0.797 0.013	1.810 0.138	1.340	Ⅶ-18

Table 10. Chow Test (Enlarged Model)

		M_1			M_3			*STD*		
		R_T	R_S	R_L	R_T	R_S	R_L	R_T	R_S	R_L
61·Ⅲ~69·Ⅳ 70·Ⅰ~79·Ⅳ	*F*値	2.28*	2.30*	2.53*	1.12	0.71	1.04	1.11	0.87	1.00
61·Ⅲ~73·Ⅳ 74·Ⅰ~82·Ⅳ	*F*値	3.07**	3.98*	2.77*	4.15**	3.70**	5.43**	5.70**	4.61**	5.55**
61·Ⅲ~75·Ⅳ 76·Ⅰ~82·Ⅳ	*F*値	6.35**	3.88**	3.57**	4.43**	2.34*	1.88	3.54**	2.23*	2.37*

* significant at 5 % level
** significant at 1 % level

(7) The degree of stability of M_3 and M_1 are not so different, but the former seems to have higher stability, in a minor degree, than the latter on the basis of the RMSPE and chow test. However, M_3 is composed of M_1 and *STD*, the sign and value of coefficient of R of regression equation have some ambiguity.

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"EMPIRICAL STUDY OF CHANGES IN ACCOUNTING POLICY" IN THE CASE OF JAPANESE ENTERPRISES

Hidetoshi YAMAJI

I

Accounting information is generally useful for achieving some socially desired targets. For example, income distribution, resource allocation including capital allocation in security markets and observation by the public of firm's behaviors can be carried out effectively by using accounting information.

But in spite of its usefulness the content of accounting information is somewhat vague because it can be calculated in different ways, depending upon alternative, but acceptable, accounting policies. According to the trial of Chambers we can calculate about 30,000,000 profit numbers in compliance with "the Generally Accepted Accounting Principles".[1] Essentially the diverse meanings of accounting information is a moot issue but it does not reach the point of destroying the current institution of accounting measurement and reporting because of the existence of "the Principle of Consistency".

Attention is briefly paid to the case of Japan. As it is known, there are many alternative accounting policies which are all permitted by "Kigyou Kaikei Gensoku". And it is also known that "Kigyou Kaikei Gensoku" has the Principle of Consistency which requires the consistent use of accounting procedures and prohibits arbitrary changes of them. It is, however, accepted that exceptional changes of accounting procedures can be made when there are plausible reasons ; but this is sometimes criticized extensively. Judging from these affairs, it is still possible for business enterprises to formally change their accounting procedures for the purpose of manipulating their accounting information.

Our main concern in this paper is the question why firms make the changes, because accounting information has a very important role in modern society. If we can not answer this question, we must reduce the extent that we are now depending on it.

In section Ⅱ, a review of previous studies concerning changes in accounting policies will be provided. In section Ⅲ, an analysis based on Japanese enterprises will be made statistically for preliminary fact finding. In section Ⅳ, two kinds of

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1) R.J.Chambers, "A Matter of Principle", *The Accounting Review,* Vol. XLI, No.3, (July, 1966), P.455.

hypothesis will be tested for explaining the phenomena of accounting policy changes. Section V concludes our analysis.

II

II—1 Review of previous studies

At first, descriptive theory trying to explain accounting policy changes was presented as the income smoothing hypothesis ; it did not necessarily criticize the misrepresentation of accounting information caused by the changes. It is often said that the dividends paid by modern big businesses become substantially interest. This inclination, in turn, forces firms to pay their dividends like interest. But the profits of firms extensively fluctuate every periods, so that if a firm produces a excess profit it wants naturally to accumulate the excess part of the profit for paying the dividends in subsequent periods. But according to the GAAP and "Kigyou Kaikei Gensoku", it is required that firms should accumulate the profits only after paying the normal corporate taxes. But for firms it would be much better to accumulate the extra profits without paying taxes than to do with paying them, which is of course against the accounting rules but is understandable from the viewpoint of firm's motivation. This is one of the reasons that the income smoothing hypothesis was theoretically accepted.

M.J.Gordon first presented the income smoothing hypothesis, asserting that managers selected accounting measurements and reporting rules for the purpose of smoothing reported profits.[2] In analyzing the changes of accounting policies empirically, he adopted the Investment Credit as a variable of accounting policy. He examined the correlation between the treatment of the item and the extent of income smoothing but in vain. After Gordon, R.M.Copeland selected as an accounting policy variable the investment account reflecting the amount of investment in unconsolidated related firms when making consolidated financial statements.[3] But he did not reach meaningful results.

Reviewing these studies critically, B.E.Cushing continued analyzing the changes of accounting policies using the income smoothing hypothesis.[4] He did not

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2) M.J.Gordon, "Postulates, Principles and Research in Accounting," *The Accounting Review* Vol. XXXIX, No. 2, (April, 1964). M.J. Gordon, B. Horwitz and P.Meyer, "Accounting Measurements and Normal Growth of the Firm", contained in *Research in Accounting Measurement* (Jaedick et al, AAA, 1966).

3) R.M.Copeland, "Income Smoothing", *Empirical Research in Accounting : Selected Studies, 1968.* R.M.Copeland and R.D.Licastro, "A Note on Income Smoothing", *The Accounting Review,* Vol, XLIII, No.3, (July, 1968).

4) B.E.Cushing, "An Empirical Study of Changes in Accounting Policy", *Journal of Accounting Research.* Vol. 7, No.2, (Autumn, 1969).

specify any accounting policy variables. The question was whether the firms manipulated the accounting procedures to realize a target EPS (Earning Per Share). He showed that about 61% of the changes of accounting policies had the income smoothing effect, and 76% of them had the effect of increasing the reported income (EPS). He concluded that, while it was impossible to clarify the structure of decision making itself concerning the change of accounting policy because of the long-term payoff of its effect, managers selected actively the timing of changing the accounting policy to represent the reported EPS in a good manner.

Subsequently we can find a different research viewpoint. Typically it is pointed out that M.L.Gosman tried to find the particular characteristics of firms which had changed their accounting policies.[5] The viewpoint of Gosman seems to be based upon the reflection on the previous hypothetical approaches. Gosman studied the correlation between the change of accounting policy and three characteristics of firm : the size of the firm, the industry and the accounting firm auditing the firm concerned. His statistical technique was the test of classification using chi-square. He concluded that there was correlation between the likelihood of changing accounting policies and the size of firm and that the Price-Waterhouse, the Librant and the Montgomery suggested more frequently changes of accounting policies than another accounting firms. But he denied any relationship between accounting policy changes and identification with a particular industry.

Next, E.B.Deakin and Cushing criticized the work of Gosman from the viewpoint of statistical technique.[6] They asserted that the chi-square test of classification was insufficient to verify the correlation between the change of accounting policy and the size of firm, while they supported the use of the Mann-Whitney U Test. They pointed out that there was no correlation between accounting policy changes and the size of firms in adopting the same data used by Gosman. Similarly, they suspected the conclusion concerning the relationship between the accounting policy changes and the industry, and the one between the accounting policy change and the accounting firm, so that they independently tested the two correlations by employing the Kruskal-Wallis Test and more strongly concluded the same results as the ones of Gosman.

The study of C.S.Warren deserves being reviewed because he collected cross-section data and used a different statistical technique, ANOVA.[7] He found that

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5) M.L.Gosman, "Characteristics of Firms Making Accounting Changes", *The Accounting Review*, Vol.XLVIII, No. 1, (July, 1973).

6) B.E.Cushing and E.B.Deakin, "Firms Making Accounting Changes : a Comment", *The Accounting Review*, Vol. XLIX, No. 1, (January, 1974). They criticized the contingency table used by Gosman and asserted to employ the non-parametric method for taking the information concerning the rank size into account.

accounting policy changes were meaningfully related to the size, the industry and the recognition of extraordinary items. W.G.Bromser pointed out that firms which had relatively worse EPS and ROI more often changed their accounting policies to manipulate the accounting information and to report their operating results in a good manner.[8)]

Recently we can find a new hypothetical approach which is proposed by G.L.Salamon and E.D.Smith.[9)] They gave attention to the fact that the big firms whose EPS were bad and whose reputation in the securities market was also bad had statistically more often an inclination to change their accounting policies than the relatively small firms. In addition, they adopted agency theory and used the assumption that the management-controlled firms more often made changes of accounting policies than the owner-controlled firms in the years that the reputation of the firm by the stockholders were bad. The first procedure for verifying this assumption was dividing firms into two groups : management-controlled and owner-controlled group. Of course the distribution of firms over different industries was statistically adjusted. The next step was counting the numbers of firm in each group in terms of whether they changed accounting procedures. Then they could use the chi-square test of independence. The result was that the management-controlled firms more often changed their accounting policies. In addition they pointed out that the management-controlled firms had many more changes in the years that their cumulative abnormal returns (CAR) were minus. They were calculated from the two parameter CAPM and seemed to represent the evaluation by stockholders of firms. These results seemed to verify the hypothesis presented by Salamon and Smith.

II—2 Some issues of previous studies

As we have already seen, the previous studies have not conclusively identified the determinants of accounting policy changes. So in this section some issues of previous studies should be pointed out for the purpose of contrasting our research mothodology.

First, the idea that some firms change their accounting policies to adjust their accounting profit numbers to the desired numbers was central in the works of Gordon and Copeland. The desired profit numbers used in their papers were calculated from relatively simple expectations models. These are as follows :[10)]

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7) C.S.Warren, "Characteristics of Firms Reporting Consistency Exceptions–A Cross-section Analysis", *The Accounting Review,* Vol. LII, No. 1, (January, 1977).

8) W.G.Bromser, "The Earnings Characteristics of Firms Reporting Discretionary Accounting Changes", *The Accounting Review,* Vol. L, No. 3, (January, 1975).

9) G.L.Salamon and E.D.Smith, "Corporate control and Managerial Misrepresentation of Firm Performance", *The Bell Journal of Economics,* Vol.10, No. 1, (Spring, 1979).

10) R.M.Copeland, *op. cit.* , pp. 542-543.

$\bar{Y}_t = \alpha\, Y_t + (1-\alpha)\, \bar{Y}_{t-1}$ (α: constant, $0 \leqq \alpha \leqq 1$)

$\bar{Y}_t = OI_{t-1} + D_{t-1}$ ($\bar{Y}_t$: smoothed EPS, OI_t: operating income, D_t: dividend)

These expectations models assume that the managers can change accounting policies to adjust accounting information to the short-term trend of accounting number (EPS). In these models the time-horizon considered is only two terms. In contrast, we assume a longer period in order to identify a stronger trend.

Second, factors other than size, accounting firm concerned, industry and control status should be tested.

Finally, the sample used in empirical studies should not be limited to the changes on which the auditors made qualifications in their auditor's reports, because the auditors and the accounting firms seldom make qualifications against the financial statements of relatively large corporations and more often do them against the ones of relatively small firms[11] When they judge whether the destruction of "the principle of Consistency" should be reported in the financial statements, they usually take their own interests into account and they think that it is less necessary to qualify the financial statements of large firms because of the stability of their managements. In considering these factors we must take all cases of changes in accounting policy into account whether or not these changes are subject to the auditor's qualification.

III

III —1 Methodology of empirical study

In this section we will report the results of two kinds of empirical studies. One is the time series analysis which aims to make clear whether the firms changing depriciation procedures adjust their current profit numbers to their long-term profit trends. The other is cross section analysis which aims to find some factors affecting the changes in accounting policy (depriciation method).

First, we discuss the time series analysis. As the first step, 50 firms were selected randomly from the firms listed in the first part (Ichibu Joujou) of The Tokyo Securities Exchange. These firms had changed the procedure of depriciation (of tangible assets) at least one time in the period from 1965 to 1980. Our assumption is that the firms adjust their current incomes (gross operating incomes) to the target trends of them by manipulating the procedures of depreciation. But in contrast with the method adopted by Copeland and Gordon the target trends of income is selectively calculated from ten kinds of trend models according to the least standard residuals. And these trends extend from 1965 to 1980 for the purpose of taking the

11) F. Newman, "The Auditing Standard of Consistency", *Empirical Research in Accounting ; Selected Studies,* 1968.

time-horizons of Japanese managers decision makings for changing accounting policy. The ten trend models are as follows :[12)]

$Yt=a+bt$ $Yt=a+bt+ct^2$ $Yt=a+bt+ct^2+dt^3$ $Yt=abt$ $Yt=abtct^2$

$Yt=abtct^2dt^3$ $Yt=at/(b+t)$ $Yt=Ke^{-\frac{a}{t}}$ $Yt=Ka^{bt}$ $Yt=K_0/(1+me^{-at})$

As the second step we must test whether the years that firms made changes are included in the upper ranks of years that the current gross operating incomes are far from the best trend of them. Then 15 years (1966 to 1980) are classified into five ranks according to the degree of difference between the real gross operating income and the estimated trend. And the sample firms changing their depreciation procedures were counted in each rank of years. If our assumption is the case, there should be more occurrences of changes in accounting policy at least in the upper two ranks than in the other ranks.

Second, we discuss the cross-section analysis. The discriminant analysis was adopted to find some plausible factors which induced firms to change their accounting policy. The sample used in this analysis consists of two parts. One was randomly selected from the firms which were used to close their accounts in March and changed the procedure of depriciation from 1976 to 1978. The other was also randomly selected from the firms which end their fiscal year in March and didn't change in the same period. This selective procedure yielded 45 firms and 115 firms respectively. Explanatory variables are concretely as follows : the amount of tangible fixed assets (X_1), the capital (X_2), the gross amount of sales (X_3), the amount of depriciation of tangible fixed assets (X_4), the degree of difference between the real operating income and the best trend of income (X_5) and the cumulative abnormal return (CAR) (X_6).

III —2 Results of analysis

The result of time series analysis is shown in **Table 1**.

Table 1.

RANK OF THE DEGREE OF DIFFERENCE BETWEEN THE REAL AND THE BEST TREND	NUMBER OF FIRMS
1	12
2	16
3	10
4	15
5	12

12) S.Tamino, "Simple & All-round Techniques for Linking Analytical and Statistical Subroutines"." contained in Studies in *Studies in Contemporary Information System, (in Japanese),* Research Institute for Economics and Business Administration, 1976, p. 146.

The data in **Table 1** is susceptible to be statistically analyzed by the chi-square test. We can conclude that there is no correlation between changes in depreciation procedure and the degree of difference between the real number of gross operating income and the estimated number of best trend because of $w=1.8$ ($\chi^2_{0.05}(4)=9.49$).

So we must look at the results of cross-section analysis. The discriminant function (F) derived from discriminant analysis[13] is as follows ;

$$F=0.22477X_1-0.33642X_2+1.70728X_3-1.58295X_4-0.04066X_5+0.30406X_6.$$

When the discriminant score of a firm is minus, the firm is considered as a firm changing the depriciation method. Of course when the score is plus, the firm is judged as the firm not changing it. The coefficients represent the degree of contribution to the discrimination of six variables. The degree of difference between the real and the estimation (X_5) clearly doesn't contribute to the discrimination, which is consistent with the result of time series analysis. Of interest is the fact that the firms of which capital (X_2) is large and the CAR is minus are considered as the firms changing the accounting method. Moreover, there is an inclination that the firms of which the gross amount of sales (X_3) is large and the cost of depreciation concerning the tangible fixed assets (X_4) is relatively small do not change the procedure. These results are understandable but the fact that the effect of the amount of tangible fixed assets is contrary to the one of the capital may suggest the limitation of our discriminant analysis. The effectiveness of discrimination is about 70%.

Judging from our results we can conclude that the firm of which the capital is large and the operating performance is relatively bad and the reputation by the stockholders (which is measured in terms of CAR) is bad more often changes the accounting policy. The next section will show two hypotheses concerning the above-mentioned results.

Ⅳ

Ⅳ—1 First hypothesis and its empirical test

In this section two hypotheses are presented and empirically tested to understand reasonably the fact that the large firm of which the operating performance is relatively bad and the reputation by the stockholders measured in terms of CAR is also bad more often changes the accounting policy. First hypothesis is based on the relationship between the capital increase and the changes in accounting policy. Second hypothesis is based on the relationship between corporate control status and changes in accounting method.

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13) Statistical package (SPSS) was employed.

We discuss the first hypothesis. The fact that the reputation by stockholders of a firm is relatively bad means the lower security return of the firm than the expected one. This inclination enforces the manager to adopt some policies which improve the operating result. But as an alternative of management policy, the manager may use the easy means to achieve rapidly good operating result. That is a change in accounting policy. In particular, the manager should change the accounting methods when he is induced to increase the capital of his firm by issuing new securities. It is hypothesized that the firm of which the CAR is minus and the plan to increase the capital is urgent more often changes accounting methods than the firm which does not have any plan to increase the capital in the near future.

For verifying the hypothesis, we selected 31 sample firms of which the CAR was minus and which did change the depreciation method and 57 firms of which the CAR was also minus and which did not change it from the sample firms employed in section 3. Next we classified each sample firms into two groups whether firms concerned increased the capitals within three years from the year that they changed the accounting policy. The result of this analysis is shown in **Table 2**.

Table 2

	NUMBER OF FIRMS INCREASED CAPITAL	NUMBER OF FIRMS NOT INCREASED CAPITAL
NUMBER OF FIRMS CHANGED DEPRICIATION METHOD	17	14
NUMBER OF FIRMS NOT CHANGED DEPRECIATION METHOD	36	21

Judging from the statistical analysis ($w \fallingdotseq -0.084$, $\alpha = 0.05$), there is no inclination that the ill-performing firms which have a plan to increase the capital more often change the accounting policy than ill-performing firms which do not have a plan to do so.

IV—2 Second hypothesis and its empirical test

The agency theory is introduced to set up the second hypothesis to understand the fact that the firms of which the capitals are large, the operating results are relatively bad and the reputation by the stockholders are bad more often change the accounting policy. The results of testing the hypothesis will be shown in contrasting Japanese

14) Emprical data used in the following description were quoted from the above mentioned paper of Salamon and Smith.

firms with American firms.The analysis is based on the one by Salamon and Smith.[14)]

A large firm is usually controlled by managers. And managers have considerable discretion in guiding the affairs of the firm. This discretion is used for achieving managerial goals, not those of stockholders. So other conditions being equal, the firm controlled by managers may operate less efficiently. The managers of ill-performing firms must exercise discretion over the accounting information in a manner which may misrepresent firm performance to conceal their inefficiency from the stockholders. This is agency theory ; by adopting this theory we can consider accounting policy changes as the manipulation of accounting information by the manager of large corporation. This is our second hypothesis.

For testing the second hypothesis we took the following procedures.

1) The sample firms are classified into two groups which consist of the management-controlled and owner-controlled.
2) We select firms which experienced accounting policy changes.
3) The reputation by the stockholders is measured in the years that the firm changed accounting procedure.
4) Unexpectedness of the earnings of firms made by the informational manipulation is measured in the years that the firm changed it.
5) Whether managers discloses the misleading information to the stockholders investigated by comparing the result of 3) with the one of 4).

First, the criteria by which the sample firms are classified into two groups is whether 10% or more of the voting stock of the firm is owned by any one party. A firm was classified as management-controlled if no single block of stock greater than 5% was controlled by any party. Whether any party exercises active control on the board of directors is also taken into account. The firms of the United States were required to meet these control criteria for each of the years 1954-1962. From 10-K and the definitive proxy statements each firm filed with the SEC are examined to verify that the ownership position reported in 1954 was maintained through 1962. Substantially we refered to the work of Professor Miyazaki [15)] when classifying the sample firms of Japan to obtain the Japanese sample for each of the years 1965-1976. The sample was balanced with respect to industry. These procedures yielded 32 firms which met the criteria for manager control and 32 firms which met the criteria for owner control in the case of the United States. 26 firms and 27 firms are obtained respectively in the case of Japan.

Second, accounting policy change data for the United States are as follows : the decisions to change an accounting method which resulted in an auditor's consistency

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15) G.Miyazaki, *Industrial Concentration in Japan After the World War II (in Japanese),* The Nihon Keizai Shinbunsha, 1976, chapter, Ⅶ.

qualification, the decisions to make an accounting change because of a changed condition and the decisions to recognize an extraordinary gain or loss. These data were obtained from the annual reports and from Form 10-K filed with the SEC from 1954-1962. The same data for Japan were selected from the financial data file made by the Japan Kougyou Bank. The 53 Japanese firms all closed their accounts in March from 1965 to 1976. They changed inventory method or depreciation method or recognized an extraordinary gain (or loss) which amounted to 1/3 of the current net income before tax.

Third, we discuss how to measure the reputation by stockholders in the year that the firm changed accounting policy. The residual (CAR) calculated from CAPM or Market Model was employed as a proxy of the reputation. In the case of the United States, the residual of CAPM was calculated as follows :

$$R_{i,t} = \gamma_{0,t} + \gamma_{1,t} \cdot \beta_i + e_{i,t}$$

$$CAR_{i,t} = \sum_{t=-11}^{0} e_{i,t}$$

where

$R_{i,t}$ =return on security i during month t

$\gamma_{0,t}$ =return on the efficient (minium variance) portfolio whose return is uncorrelated with the return on the market portfolio ($R\,m,t$)

$\gamma_{1,t} = R_{m,t} - \gamma_{0,t}$

$e_{i,t}$ =abnormal return on security i month t

β_i =ratio of the covariance between $R_{i,t}$ and $R_{m,t}$ to the variance of $R_{m,t}$ (also called systematic risk of firm i)

In the case of Japan the residual of Market Model was used as follows :

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + e_{i,t}$$

$$CAR_{i,t} = \sum_{t=-5}^{0} e\,i,\,t$$

$R_{m,t}$ =return on the market portfolio during month t

where $R_{i,t}$, β_i, $e_{i,t}$ have the same meanings as the ones of *CAPM*. The fact that $CAR_{i,t}$ is minus means a bad reputation by stockholders of firm i. The plus *CAR* means the good reputation. It is interpreted that a firm changing the accounting policy at $t=0$ has the desire to improve the bad reputation by manipulating the accounting profit number. Such a inclination may appear in the firms controlled by manager according to our hypothesis.

Fourth, we must devise the means of measuring the result of informational manipulation. It is the unexpected earnings (*UE*) that we can use as the means of measuring it. The *UE* of firm at the closing month where the accounting policy was changed is the result from manipulating the accounting number. Unexpected earnings

is calculated from the following procedure ;

$$UE = E(Y_t) - Y_t$$

where

$E(Y_t)$=expected value of accounting profit

Y_t=real value of accounting profit

The real form of $E(Y_t)$ employed in this study is

$E(Y_t) = Y_{t-1}$.

In the case of the United States Y_t is earnings per share (EPS). In analyzing the data of Japanese enterprises Yt is current operating income in the case of the change in inventory method and in depriciation method, and is current net income before tax in the case of a large amount of extraordinary gain (loss). The sign of UE means unexpecteness of accounting information. The fact that the CAR of firm i is minus means a bad reputation by stockholders of firm i. If the manager of firm i yields unexpected accounting information (accounting profit number) by changing the accounting policy arbitrarily, it may be possible that the stockholders of firm i alter their evaluation about management ability. So according to our second hypothesis the signs of CAR and of UE of management-controlled firms are more often different from each other in accounting policy change years than owner-controlled firms.

Fifth, a chi-square test using a 2×2 contingency table was used to test the null hypothesis that there is no difference between management and owner controlled firms in the proportion of accounting policy change years in which there is consistency in the sign of UE and CAR. The results presented in **Table 3** is consistent with the informational manipulation hypothesis in that the proportion of accounting policy change years in which the signs of UE and CAR are the same is significantly lower for management-controlled firms of the United States than for owner-controlled firms of the United States (significant level 0.10). But the evidence of Japan didn't reject the same null hypothesis (significant level 0.10).

Table 3. CONTROL STATUS OF FIRMS AND CONSISTENCY IN THE SIGNS OF UNEXPECTED EARNINGS (UE) AND CUMULATIVE ABNORMAL SECURITY RETURNS (CAR)

	USA		JAPAN	
	CONTROL MANAGEMENT-CONTOROLLED	STATUS OWNER-CONTOROLLED	CONTOROL MANAGEMENT-CONTOROLLED	STATUS OWNER-CONTOROLLED
SIGNS OF CAR AND UE IN ACCOUNTING POLICY CHANGE YEARS :				
NO. OF CONSISTENT CASES	61	56	20	22
NO. OF INCONSISTENT CASES	42	23	6	5

The next procedure is to test the hypothesis for management and owner controlled firms that there was no difference between the security return performance of a firm in the year 1954-1962 sample period of the United States and in the year 1965-1976 sample period of Japan. A Chi-square test was also employed. In the case of the United States the evidence presented in **Table 4—1** is consistent with the informational manipulation hypothesis in that there is no significant association between the timing of accounting policy changes and security return performance for owner-controlled firms, but there is a significant association for management-controlled firms (significant level 0.05). But in the case of Japan (**Table 4—2**) there are significant associations both for management controlled firms and owner controlled firms (significant level 0.05).

Table 4—1. ACCOUNTING POLICY CHANGE YEARS AND CUMULATIVE ABNORMAL SECURITY RETURNS (CAR) 1954-1962 (USA)

	MANAGEMENT CONTROLLED FIRMS		OWNER CONTROLLED FIRMS	
	SIGN OF CAR		SIGN OF CAR	
	+	−	+	−
MEMBER OF : POLICY CHANGE YEARS	44	59	39	40
OTHER YEARS	107	76	110	96

Table 4—2. ACCOUNTING POLICY CHANGE YEARS AND CUMULATIVE ABNORMAL SECURITY RETURN (CAR) 1965-1976 (JAPAN)

	MANAGEMENT CONTROLLED FIRMS		OWNER CONTROLLED FIRMS	
	SIGN OF CAR		SIGN OF CAR	
	+	−	+	−
POLICY CHANGE YEARS	24	28	27	38
OTHER YEARS	34	18	39	26

Judging from the above mentioned evidence the hypothesis based on agency theory fits the cases of American firms but does not fit to the cases of Japanese firms. In the United States, the management-controlled firms more often change the accounting policy in the years that the reputations by stockholders are bad than owner-controlled firms. In Japan both management-controlled firms and owner-controlled firms have an inclination to change the accounting policy in the years that the security return performance are bad (which meant the bad reputation by the stockholders).

V

The following facts concerning changes in accounting policy were pointed out in this empirical study.

(1) The large firms both in the United States and in Japan more often change the accounting policy in the year that the operating results and reputations of the firms are bad than in the ordinary years. This inclination indicates that the motivation to manipulate accounting information in the years of dull business is stronger than the one to do it in the years of brisk business.But it was not for the plan of capital increase.

(2) The large firms changing the accounting procedures can be considered as management-controlled firms in the United States based on the agency theory. But such a consideration could not be made in the cases of Japanese firms. This difference may be due partly to some statistical issues, partly to the differences of the function of securities markets and partly to the different degree of maturity of management labour market.[16)]

16) E.F.Fama, "Agency Problems and the Theory of Firm", *The Journal of Political Economy*, Vol. 88, No. 1–3, 1980.

AN EMPIRICAL STUDY ON INTERNATIONAL SHORT-TERM CAPITAL MOVEMENTS IN JAPAN

Hideki IZAWA

1. Introduction

Recently, the movements of the international capital, especially, short-term capital, shown in Table 1, have been of much more importance with the rapid liberalization in both the foreign exchange market and the capital (money) market in Japan. Nowadays, people have to pay a lot of attention to the effect of the capital flows on exchange rates and the balance of payments.

In this paper, I try to present a theoretical explanation of international short-term capital movements and some empirical results of its determinants.

In section 2, I describe briefly a theoretical framework of determination of international short-term capital movements based on the simultaneous equilibrium analysis in the spot and forward markets. In section 3, I proceed to estimate empirically the short-term capital movements function, defined broadly to include securities investments (from the long-term capital accounts). In the late 60's or early 70's, econometric analysis began to be applied to the capital account of some developed countries. Mutoh & Hamada (1984) reported some empirical tests using monthly data for Japan from 1973 to 1980. I update this analysis in this paper. In section 4, I conclude by reporting my main findings and some problems to be solved.

2. Theoretical Framework

There are various views on international short-term capital movements. The basic views are : high interest rates in the U.S. ; or the change in interest rate differential rather than the interest rate differential itself ; the attraction of dollars as a safe asset in case of emergencies ; the stages theory of the development of the balance of payment (i.e. Japanese economy as young creditor) ; and so on.

Tsiang (1959) pioneered a rigorous theoretical framework with the integration of the spot and forward exchange markets and Hodjera (1973) presented a survey article. However, it seems that we have not had much theoretical progress since then.

Tsiang–Sohmen classified forward exchange operations according to the "function" of a particular transaction rather than the "person" who undertakes it. Although real market participants often perform two or more types of these functions,

Table 1

(U.S. $ million)

Item / Year	Current Balance	Trade Balance	Exports	Imports	Services	Unrequited Transfers	Long-Term Capital	Basic Balance	Short-Term Capital	Errors & Omissions	Overall Balance	Balance of Monetary Movements	Gold & Foreign Exchange Reserves	Others
1973	△ 136	3,688	36,264	32,576	△ 3,510	△ 314	△ 9,750	△ 9,886	2,407	△ 2,595	△ 10,074	△ 10,074	△ 6,119	△ 3,955
74	△ 4,693	1,436	54,480	53,044	△ 5,842	△ 287	△ 3,881	△ 8,574	1,778	△ 43	△ 6,839	△ 6,839	1,272	△ 8,111
75	△ 682	5,028	54,734	49,706	△ 5,354	△ 356	△ 272	△ 954	△ 1,138	△ 584	△ 2,676	△ 2,676	△ 703	△ 1,973
76	3,680	9,887	66,026	56,139	△ 5,867	△ 340	△ 984	2,696	111	117	2,924	2,924	3,789	△ 865
77	10,918	17,311	79,333	62,022	△ 6,004	△ 389	△ 3,184	7,734	△ 648	657	7,743	7,743	6,244	1,499
78	16,534	24,596	95,634	71,038	△ 7,387	△ 675	△ 12,389	4,145	1,538	267	5,950	5,950	10,171	△ 4,221
79	△ 8,754	1,845	101,232	99,387	△ 9,472	△ 1,127	△ 12,618	△ 21,372	2,377	2,333	△ 16,662	△ 16,662	△ 12,692	△ 3,970
80	△ 10,746	2,125	126,736	124,611	△ 11,343	△ 1,528	2,394	△ 8,352	3,071	△ 3,115	△ 8,396	△ 8,396	4,905	△ 13,301
81	4,770	19,967	149,522	129,555	△ 13,573	△ 1,624	△ 6,449	△ 1,679	△ 958	493	△ 2,144	△ 2,144	3,171	△ 5,315
82	6,850	18,079	137,663	119,584	△ 9,848	△ 1,381	△ 14,969	△ 8,119	△ 1,579	4,727	△ 4,971	△ 4,971	△ 5,141	170
83	20,799	31,454	145,468	114,014	△ 9,106	△ 1,549	△ 17,700	3,099	23	2,055	5,177	5,177	1,234	3,943
84	35,003	44,257	168,290	124,033	△ 7,747	△ 1,507	△ 49,651	△ 14,648	△ 4,295	3,743	△ 15,200	△ 15,200	1,817	△ 17,017

Source : Balance of Payments Monthly, Foreign Department, The Bank of Japan, No. 223, Feb. 1985, Summary Table, pp. 1-2.

it is convenient, for theoretical simplification, to separate forward market transaction into (i) hedging–to insure against the risk of exchange fluctuation, affecting merchants' current foreign trade, (ii) arbitrage–international transfer of spot funds for short-term investment purposes covered by a simultaneous forward transaction of the same amount in the opposite direction, and (iii) speculation–taking a net open (short or long) position with a view to profiting from the discrepancy between the current forward rate and the expected future spot rate. It is purely a matter of notational convenience whether the "functional" or the "personal" approach is chosen and will necessarily give the same results.

The SS-curve in Figure 1 shows the excess supply of spot foreign exchange caused by payment or receipt in connection with foreign trade and settlement of previous speculative commitments in the spot foreign exchange market. The FF-curve in Figure 1 shows the excess supply of forward foreign exchange derived from hedging of export-import traders. And the PP-curve shows the excess supply of forward foreign exchange of speculators and the intercept of the PP-curve with the vertical axis is the expected future spot rate. The QQ-curve shows the horizontal sum of the FF-curve and the PP-curve.

There are some assumptions :

1. The covered interest arbitrage holds.
2. The supply and demand for settlement purpose (SS-curve) doesn't depend on the expected future spot rate.
3. The supply and demand for forward exchange based on speculative motive comes out in the forward foreign exchange market, not in the spot one. The spot speculation is regarded as the combination of arbitrage and forward speculation.
4. There is only one forward market which has a specified period, for example, three month.

The simultaneous equilibrium conditions in spot and forward markets consist of the following equations.[1)]

---

1) By solving equations (1)–(3), we obtain the (gross) capital inflow function ;

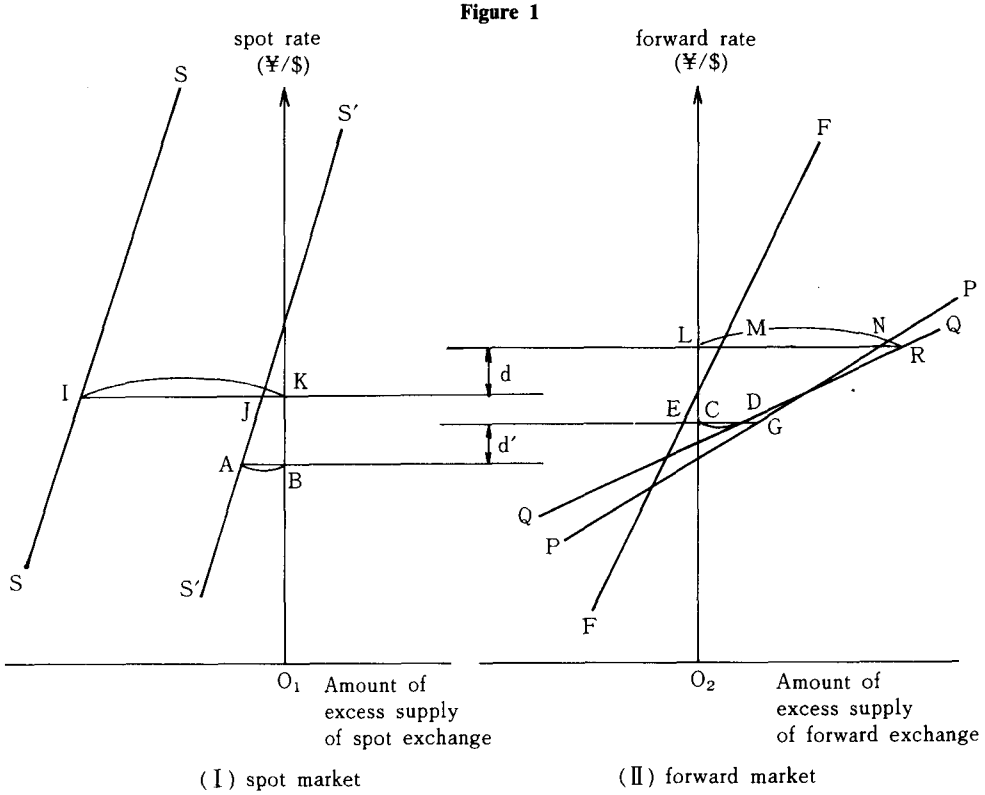
$$A_t = b_0 + b_1 (i_t - i^*_t) + b_2 \cdot \triangle R + b_3 \cdot {}_t s_{t+1} + b_4 \cdot (f_{t-1} - {}_{t-1} s_t)$$

where $b_0 = -\frac{a_2}{\triangle s} a_5 + \frac{(a_1 + a_4) f}{\triangle s^2} a_3 \gtrless 0$, $b_1 = \frac{-a_2 (a_1 + a_4)}{\triangle} > 0$, $b_2 = \frac{-(a_1 + a_4) f}{\triangle s^2} > 0$,

$b_3 = \frac{a_1 a_2}{\triangle s} < 0$, and $b_4 = \frac{-(a_1 + a_4) f a_1}{\triangle s^2} > 0$,

$\triangle = -(a_1 + a_4) \frac{f}{s^2} - a_2 \frac{1}{s} < 0$, by the stability conditions.

Figure 1



(Ⅰ) spot market (Ⅱ) forward market

$$\underbrace{a_1 \cdot (f_{t-1} - {}_{t-1}s_t)}_{\text{the demand for the spot exchange from settlement of previous speculation}} + \triangle R_t = A_t + \underbrace{(a_2 \cdot s_t + a_3)}_{\text{the supply of the spot exchange from traders' settlement}} \cdots\cdots(1)$$ equilibrium condition for the spot market

$$\underbrace{a_1 \cdot (f_t - {}_t s_{t+1})}_{\text{the supply of the forward exchange from speculation (PP-curve)}} + \underbrace{a_4 \cdot f_t + a_5}_{\text{the supply of the forward exchange from hedging (FF-curve)}} = A_t \cdots\cdots(2)$$ equilibrium condition for the forward market

$$i_t = i^*_t + \frac{f_t - s_t}{s_t} \cdots\cdots(3)$$ interest rate parity

where s_t and f_t are the spot and forward exchange rate in the t-th period. ${}_t s_{t+1}$ is the spot rate of the $(t+1)$ th period expected at the t-th period and given. A is the amount of the spot supply of (forward demand for) arbitrage fund. i and i^* are the short-term interest rate of domestic and foreign country and assumed exogenous. $\triangle R$ is the

amount of official intervention (purchase) in the spot foreign exchange market. a_i's ($i=1,\cdots,5$) are assumed to be positive but a_2 or a_4 may be negative because of the J-curve effect (that is because the Marshall–Lerner condition is not satisfied in the short run).

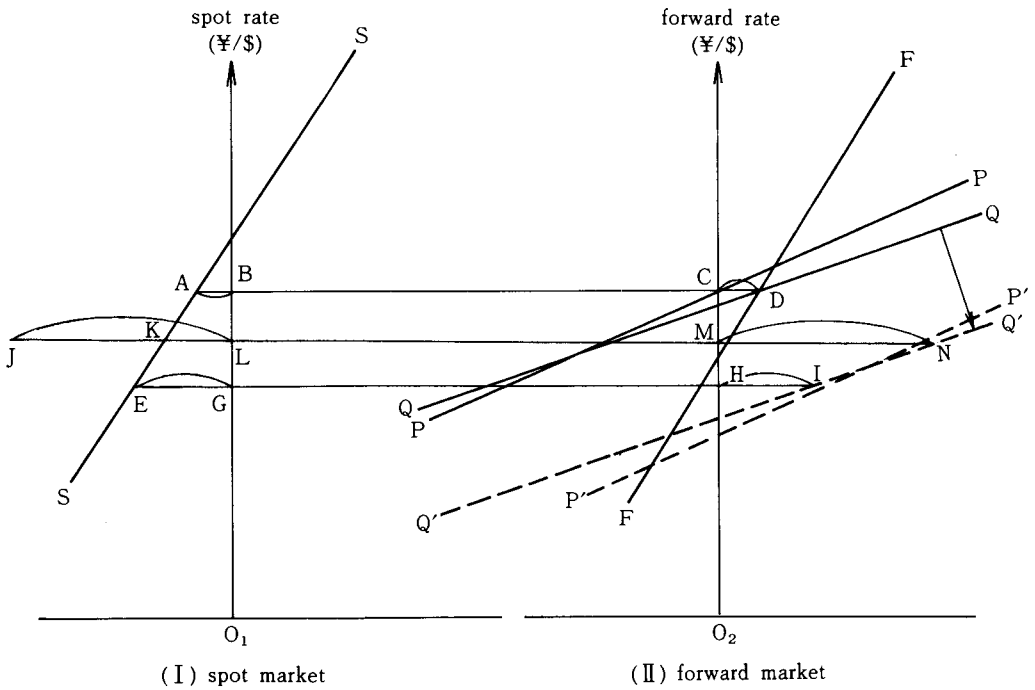
According to the Tsiang–Sohmen model mentioned above, all international short-term capital movements can be interpreted as being caused by interest arbitrage, and such international short-term capital flows through interest arbitrage mechanism finance the deficits or surpluses on the current balance or basic balance.

Now, let us think about the relationship between speculation due to the change in expectation of the future spot rate and international short-term capital flow. In Figure 2, we assume that the interest rate differential is zero, thereby O_1B is equal to O_2C and AB is equal to CD. If people expect the yen/dollar exchange rate to appreciate in the near future, the *PP* and *QQ* curves will shift to the right to *P'P'* and *Q'Q'* curves respectively. Both the spot rate and the forward rate will appreciate and arbitrage fund (*i.e.* capital inflow) will increase to EG (=HI).

But, as the slope of the *SS*-curve is very small in the short run, a large amount of capital inflow (outflow) will not occur, if there is no official intervention into the spot foreign exchange market.

On the contrary, if the monetary authorities attempt to maintain the targeted spot

Figure 2

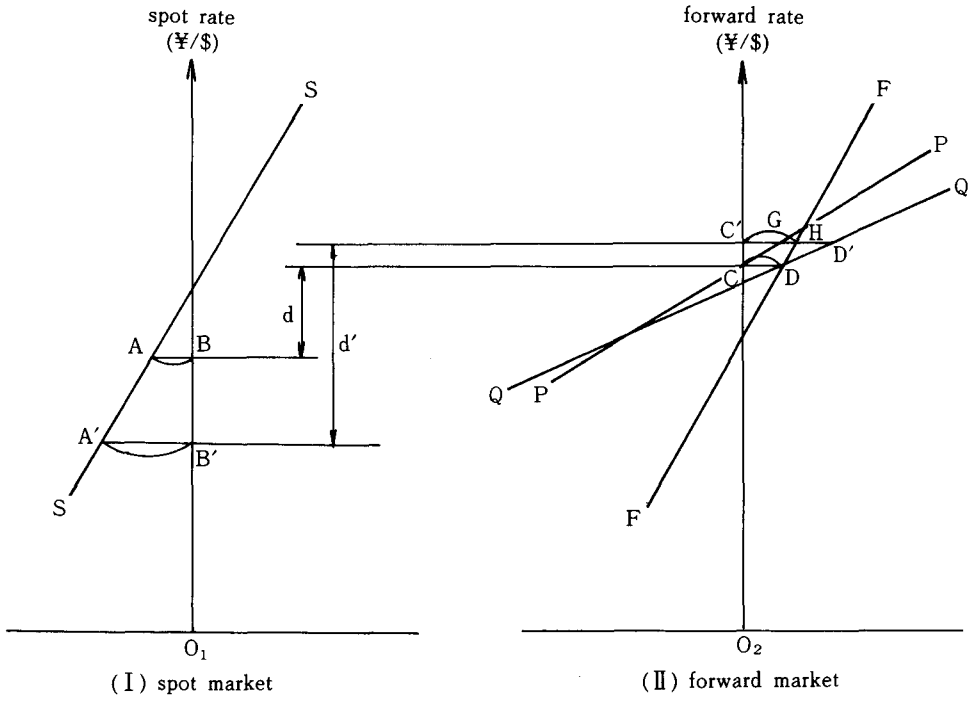


rate, for instance at the level of O_1L, to prevent the yen/dollar rate from appreciating, they must purchase dollars by MN minus KL (*i.e.* JK). The monetary authorities become the partner of arbitrageurs' transaction in the spot market, so that capital inflows by MN (=JL), therefore, the net inflow is the difference between JL and AB and foreign reserve increases by JK.

Next, let us think about the relationship between the change in the interest rate differential and the short-term capital flow. In Figure 3, suppose that the domestic interest rate rises and the interest rate differential becomes wider, so that the spread between the spot rate and the forward rate changes from d to d′. For the moment, if we assume that *SS*, *FF*, and *PP* curves remain unchanged, interest arbitrage inflow from abroad to Japan becomes advantageous and the spot sale of dollar and the forward purchase of dollar cause the spot (forward) rate to appreciate (depreciate). The new equilibrium is reached when the spread (premium) becomes equal to the interest rate differential again. The amount of inflow of arbitrage funds increases from AB to A′B′.

As we mentioned earlier, we can interpret all inflows of short-term capital as the phenomenon brought about by interest arbitrage transaction. However, the covered interest arbitrageurs need find their transaction partner in both spot and forward markets. But, we think that the elasticity of demand (or supply) for spot settlement with respect to the spot rate is very small and may be negative in case of the existence

Figure 3



of J-curve effect. Then, the effect of the change in the interest rate differential appears as the change in the spot rate relative to the change in the forward rate and the amount of arbitrage fund hardly changes. Therefore, it is expected that a quick price-adjustment happens instead of a quantity-adjustment.

By the way, the Tsiang–Sohmen model mentioned above has some problems. First, it is basically static and a partial equilibrium model ; the interest rates and the expected future spot rate are assumed to be given or exogenous. Second, the model doesn't deal with risk adequately. After all, we still face the difficulty in formulating a complete and general equilibrium theory of short-term capital movements. At least, however, it is possible to make interest rates endogenous and introduce a reaction function of intervention.

3. Empirical Results

One of the major questions here is whether international short-term capital movements respond to the interest rate differential or to a change in the interest rate differential. The former is called the flow approach of short-term capital movements, and the latter is called the stock approach, consistent with the Tobin–Markowitz theory of portfolio selection. The stock approach can explain two-way international short-term capital movements by international asset diversification.

As already pointed out, the Tsiang–Sohmen model is basically a variant of the stock approach and a once and for all change in interest rate differential will generate only a temporary (net) capital movements, not a continuous flow as in the flow approach.

The pure flow, stock, and stock-adjustment versions of the regression equations are as follows :

$$\triangle SC_t = a_0 + a_1 (i_t - i_t^*) + a_2 \cdot r_t \cdots\cdots \text{a flow approach}$$

$$SC_t = b_0 + b_1 \cdot (i_t - i_t^*) + b_2 \cdot r_t \cdots\cdots \text{a stock approach}$$

$$(\Rightarrow \triangle SC_t = b_1 \cdot \triangle (i_t - i_t^*) + b_2 \triangle r_t)$$

$$SC_t = c_0 + c_1 \cdot (i_t - i_t^*) + c_2 \cdot r_t + c_3 \cdot SC_{t-1} \cdots\cdots \text{a stock-adjustment approach}$$

$$(\Rightarrow \triangle SC_t = c_1 \cdot \triangle (i_t - i_t^*) + c_2 \cdot \triangle r_t + c_3 \cdot \triangle SC_{t-1})$$

$$\triangle SC_t = SC_t - SC_{t-1} = c_0 + c_1 (i_t - i_t^*) + c_2 \cdot r_t, \qquad \text{if } c_3 = 1$$

where $\triangle SC$ (SC) is the flow (stock) of the resident's short-term foreign assets. r stands for speculation or risk but we could not help ignoring this element in our analysis because we cannot get the appropriate observable value.

If the coefficient of the lagged value of the dependent variable (c_3) is nearly equal to one, there is a pitfall that we cannot distinguish between the flow approach

and the stock approach. Likewise, if the stock-adjustment spreads over the long period, we have the trouble that we may identify the two econometrically.

We estimated the following specified regression equations to test the hypotheses using monthly data during the two periods from May, 1979 (the liberalization of Gensaki transaction by non-residents) to September, 1984 and from December, 1980 (the enforcement of the new, amended 'Foreign Exchange and Foreign Investment Control Act') to September, 1984, and also using quarterly data from the second quarter in 1977 to the third quater in 1984. The values of short-term capital movements are given and plotted in Figure 4.

$$\triangle SC_t = a_0 + a_1 (i_t - i_t^*) + a_2 \cdot \triangle R_t \cdots\cdots \text{a flow approach}$$

$$\triangle SC_t = b_1 \cdot \triangle (i_t - i_t^*) + b_2 \cdot \triangle R_t \cdots\cdots \text{a stock approach}$$

$$\triangle SC_t = c_1 \cdot \triangle (i_t - i_t^*) + c_2 \cdot \triangle R_t + c_3 \cdot \triangle SC_{t-1} \cdots\cdots \text{a stock-adjustment approach}$$

The a_2 or b_2 shows the 'offsetting coefficient'.

(Data)

$\triangle SC$: the short-term capital accounts plus securities investment of the long-term capital accounts, millions of dollar

$\triangle R$: the change in foreign exchange reserves (=the amount official intervention into foreign exchange market), millions of dollar

i : the yield of three-month bond trading with repurchase agreement (Gensaki), %

i^* : the TB rate, U.S., %

(Source) NEEDS (Nikkei) and IFS (IMF)

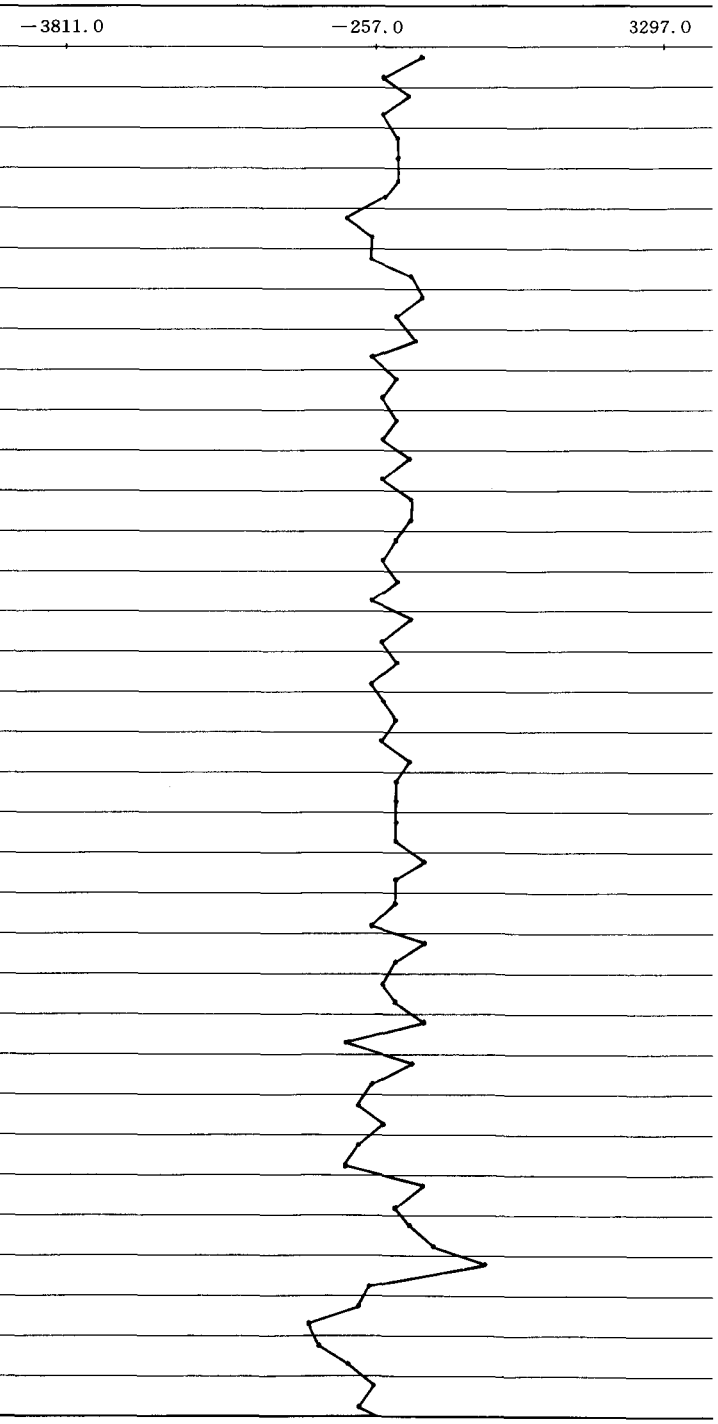
The results are shown in Table 2.

As we can see in Table 2, it can be said that they are not satisfactory in general. The values of R^2's are very low. This means that the assumed explanatory variables cannot explain the volatile fluctuations of short-term capital flows. However, the result seems to be consistent with the conclusion of the Tsiang–Sohmen model ; the interest rate differential is not statistically significant, but both the change in the interest rate differential and the change in reserves are statistically significant in regressions (5′) and (6) in Table 2.[2] The offsetting coefficients are about 1 in (5′) and (6). This implies that intervention causes short-term capital movements by about the

2) Although I have attempted the estimation using the Almon lag with respect to (the change in) the interest rate differential, I did not get different results. And I used the actual spot exchange rates, s_{t+1} or s_{t+3} as the proxy for expectation at the t-th period, assuming rational expectation. The explanatory variable was statistically significant but the explanatory power was not improved so much.

Figure 4. The movements of the short-term capital (including securites investment of the long-term capital) March, 1973 - September, 1984.

Date	Unit : million dollar
73.03	385.0
73.04	−25.0
73.05	240.0
73.06	−2.0
73.07	15.0
73.08	75.0
73.09	172.0
73.10	−18.0
73.11	−571.0
73.12	−236.0
74.01	−250.0
74.02	345.0
74.03	393.0
74.04	51.0
74.05	197.0
74.06	−278.0
74.07	178.0
74.08	−131.0
74.09	81.0
74.10	−49.0
74.11	241.0
74.12	−6.0
75.01	232.0
75.02	246.0
75.03	162.0
75.04	−144.0
75.05	147.0
75.06	−309.0
75.07	193.0
75.08	−54.0
75.09	54.0
75.10	−235.0
75.11	−53.0
75.12	117.0
76.01	−104.0
76.02	225.0
76.03	184.0
76.04	183.0
76.05	80.0
76.06	32.0
76.07	402.0
76.08	169.0
76.09	127.0
76.10	−269.0
76.11	489.0
76.12	42.0
77.01	4.0
77.02	73.0
77.03	415.0
77.04	−614.0
77.05	246.0
77.06	−258.0
77.07	−516.0
77.08	−114.0
77.09	−420.0
77.10	−556.0
77.11	536.0
77.12	94.0
78.01	329.0
78.02	631.0
78.03	1429.0
78.04	−314.0
78.05	−436.0
78.06	−1135.0
78.07	−1043.0
78.08	−545.0
78.09	−259.0
78.10	−358.0



Date	Unit : million dollar
78.11	20.0
78.12	−427.0
79.01	733.0
79.02	−772.0
79.03	−1259.0
79.04	−1475.0
79.05	215.0
79.06	−185.0
79.07	543.0
79.08	1494.0
79.09	−544.0
79.10	−968.0
79.11	1014.0
79.12	146.0
80.01	1868.0
80.02	1640.0
80.03	−321.0
80.04	−2199.0
80.05	1686.0
80.06	1945.0
80.07	1184.0
80.08	1938.0
80.09	813.0
80.10	−92.0
80.11	2614.0
80.12	189.0
81.01	2773.0
81.02	1586.0
81.03	2788.0
81.04	−2101.0
81.05	16.0
81.06	−1008.0
81.07	−649.0
81.08	819.0
81.09	175.0
81.10	−1901.0
81.11	3097.0
81.12	−255.0
82.01	−891.0
82.02	−1685.0
82.03	127.0
82.04	−3100.0
82.05	1164.0
82.06	−1961.0
82.07	147.0
82.08	344.0
82.09	−969.0
82.10	−497.0
82.11	3297.0
82.12	281.0
83.01	−377.0
83.02	−225.0
83.03	−170.0
83.04	−1229.0
83.05	282.0
83.06	−781.0
83.07	−1133.0
83.08	−1235.0
83.09	−1245.0
83.10	−1846.0
83.11	1149.0
83.12	−706.0
84.01	−494.0
84.02	−1864.0
84.03	−1910.0
84.04	−3515.0
84.05	−2702.0
84.06	−3230.0
84.07	−3811.0
84.08	−3403.0
84.09	−1611.0

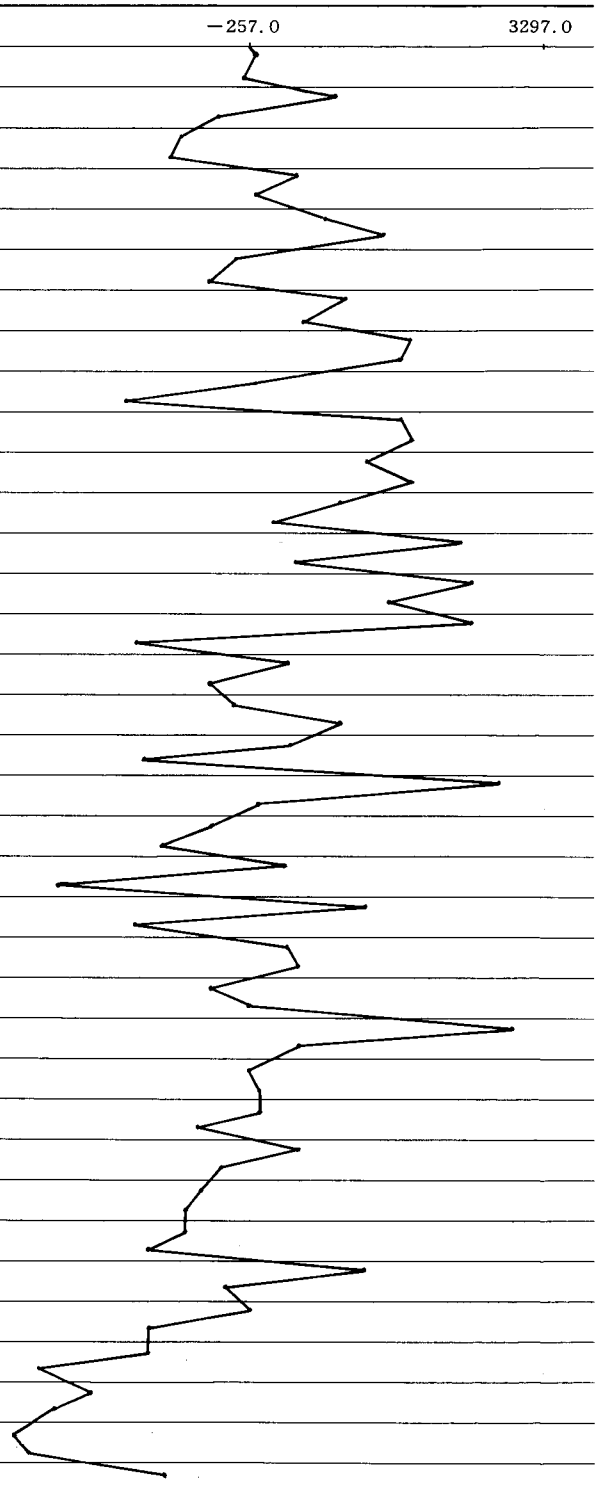


Table 2. The estimated results of the short-term capital flows

method of estimation–Ordinary Least Squares or Cochrane–Orcutte

the dependent variable–$\triangle SC$

no.	period	cons.	$(i-i^*)$	$\triangle(i-i^*)$	$\triangle R$	$\triangle SC_{t-1}$	R^2/S. E.	D.W. / ρ
1	May 1979 ⌇ September 1984	99.68 (0.29)	89.98 (1.24)		0.26 (0.98)		0.02 / 1.65×10^3	1.35
1′		155.90 (0.34)	113.99 (1.19)		0.24 (0.90)		0.12 / 1.57×10^3	2.21 / 0.33
2				99.29 (0.57)	0.33 (1.29)		−0.005 / 1.67×10^3	1.28
2′				271.47 (1.49)	0.26 (0.98)		0.14 / 1.56×10^3	2.24 / 0.39
3				176.81 (1.07)	0.30 (1.22)	0.36 (3.04)	0.11 / 1.57×10^3	2.22
4	December 1980 ⌇ September 1984	−665.67 (−1.24)	−9.52 (−0.09)		0.74 (1.31)		−0.004 / 1.70×10^3	1.39
4′		−443.80 (−0.61)	46.60 (0.33)		0.82 (1.45)		0.09 / 1.63×10^3	2.18 / 0.32
5				464.59 (1.73)	1.02 (1.72)		−0.05 / 1.74×10^3	1.11
5′				591.33 (2.45)	1.06 (1.96)		0.16 / 1.57×10^3	2.25 / 0.45
6				506.77 (2.03)	0.99 (1.79)	0.37 (2.84)	0.09 / 1.61×10^3	2.17
7	1977, II ⌇ 1984, III	−285.28 (−0.29)	162.50 (0.67)		0.21 (0.77)		−0.01 / 3.43×10^3	0.84
8				61.20 (0.20)	0.24 (0.92)		−0.05 / 3.49×10^3	0.79
9				216.57 (0.81)	0.18 (0.80)	0.62 (3.41)	0.24 / 2.98×10^3	2.14

Note : R^2=determination coefficient adjusted by degree of freedom, *S. E.* =standard error of the regression, *D.W.*=Durbin-Watson ratio, ρ =serial correlation coefficient of error term, *t*-values in parentheses.

same amount. The speed of adjustment in stock-adjustment equations are about 0.3 in monthly data and about 0.6 in quarterly data. Kouri and Porter (1974) presented results of the offsetting coefficients under the fixed exchange rate system. Their hypothesis is that a change in the base money used as an exogenous policy instrument by the monetary authorities may be offset by induced capital movements. If the coefficient of change in the domestic base money component is equal to unity, the component is perfectly offset by capital flows ; if it is equal to zero, there is no offsetting at all, this means that offsetting of the capital movements on money supply is completely sterilized by the authorities. An offsetting coefficient close to unity also implies a high degree of integration between domestic and foreign capital markets and the monetary authorities are powerless to sterilize the offsetting of international capital movements on domestic money supply. According to Kouri and Porter's results using quarterly data, the offsetting coefficient for Germany is about 0.7, 0.6 for the Netherlands, 0.5 for Australia, and 0.4 for Italy. It appears that German monetary policy was not so effective during the 1960's, as it was largely offset by induced capital movements. This result indicates that while monetary policy had a strong effect on the capital account in all the four countries, there was some room for independent monetary policy.

4. Concluding Remarks

Let us conclude this paper by summarizing some main findings and problems to be solved.

Generally speaking, by Table 2 , we support the conclusion of the Tsiang–Sohmen theoretical model. Although the explanatory power of the regressions is very low, we get the results that the interest rate differential is not statistically significant but both the change in interest rate differential and the change in reserves are statistically significant in the estimation period from Dec. 1980 to Sep. 1984. Mutoh and Hamada (1984) also present a similar empirical result using slightly different variables in the estimation period from Mar. 1973 to Dec. 1980. The offsetting coefficient is about unity. This implies that short-term capital movements is caused, to large extent, by the intervention.

It must be admitted that there still remains the most difficult problems to be solved empirically. We need more appropriate independent variables to improve the explanatory power, the adequate proxy for speculation or risk, and a satisfactory hypothesis cocerning expectation formation of a future spot exchange rate.

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